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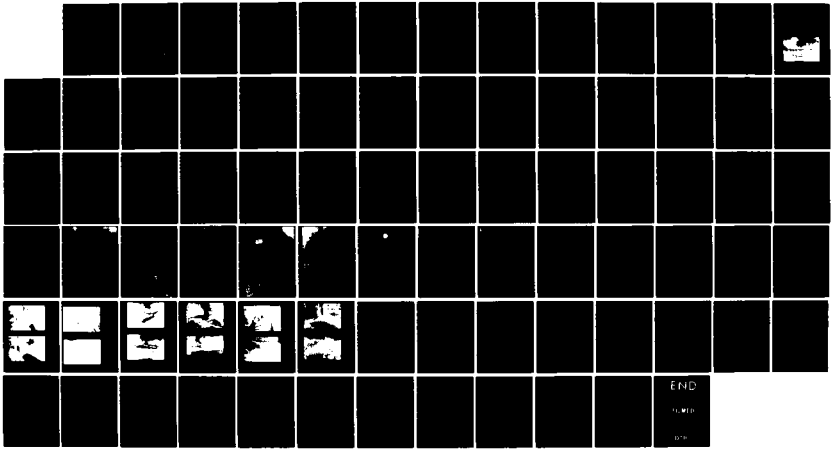

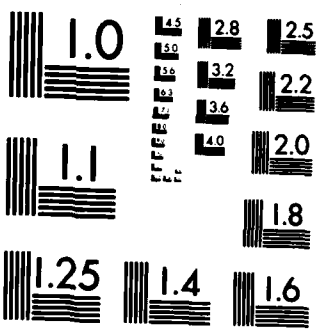

2

HOUSATONIC RIVER BASIN
PITTSFIELD, MASSACHUSETTS

PONTOOSUC LAKE DAM
MA 00309

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JULY 1978

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Housatonic River Basin
Pittsfield, Massachusetts
West Branch, Housatonic River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is about 125 ft. long and about 19 ft. high with a dropped center spillway. The dam is considered to be in fair condition. If the assessable deficiencies are not totally remedied and monitored, they have the potential for developing into hazardous conditions. The dam is classified as intermediate in size with a high hazard potential.

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PONTOOSUC LAKE DAM
MA 00309

HOUSATONIC RIVER BASIN
PITTSFIELD, MASSACHUSETTS

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

This Phase I Inspection Report on Pontoosuc Lake Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

HOUSATONIC RIVER BASIN
PONTOOSUC LAKE DAM
INVENTORY NO. MA 00309
PHASE I INSPECTION REPORT

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APPENDICES

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Inventory No.:	MA 00309
Name of Dam:	PONTOOSUC LAKE DAM
Town Located:	PITTSFIELD
County Located:	BERKSHIRE
State Located:	COMMONWEALTH OF MASSACHUSETTS
Stream:	WEST BRANCH, HOUSATONIC RIVER
Date of Inspection:	23 JUNE 1978

BRIEF ASSESSMENT

Pontoosuc Lake Dam is a gently arched stone masonry and concrete gravity dam about 125 feet long, about 19 feet high with a dropped center spillway, 80 feet long with 4 feet of freeboard. A low level intake structure and sluiceway are located on the west abutment. Discharges through the sluiceway pass through a 7 foot diameter pipe (flume), into a channel which converges downstream with the spillway channel to form the West Branch of the Housatonic River.

Phase I investigation of Pontoosuc Lake Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the outlet works and dam, the project is considered to be in fair condition. The project, has a number of deficiencies and unknown factors whose causes and circumstances are not sufficiently defined to assess the performance of the dam under flood conditions. In addition, the assessable deficiencies, if not thoroughly remedied and monitored, have the potential for developing into hazardous conditions.

Because the dam is classified as intermediate in size, with a high hazard potential, the test flood, in accordance with Corps of Engineers guidelines, is the Probable Maximum Flood (PMF). The peak outflow discharge for the PMF is 18,077 cfs or 9 times the spillway maximum discharge capacity of 1980 cfs. The PMF will cause the lake level to rise

to El 1112.66 or 10.66 feet above the top of the dam. The dam will also be overtopped by one half the PMF, which has a peak discharge of 7831 cfs or 4 times the spillway capacity. Since the dam will be overtopped by the test flood, it is considered that the spillway is seriously inadequate from a hydraulic and hydrologic viewpoint.

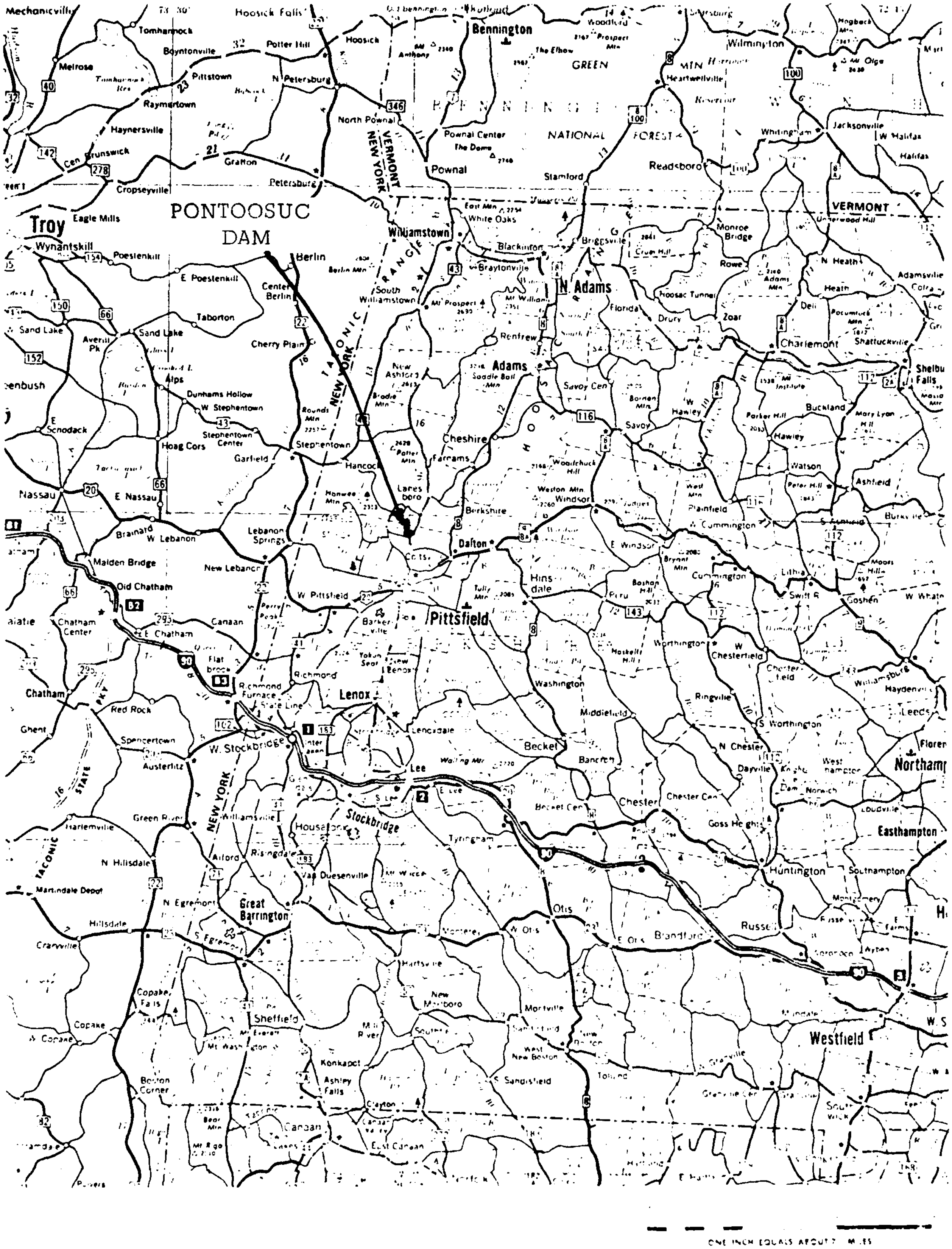
Although the dam does not appear to be in imminent danger under present conditions, it is recommended that the owner, within 12 months of receipt of this report, retain a competent consulting engineer to conduct additional investigations to determine and evaluate the following: subsurface conditions, soil parameters, elevations of base of dam and walls, nature of seepage conditions, and detailed hydrologic studies at the damsite. These investigations should include, but not necessarily be limited to, subsurface exploration and testing, surveys, piezometric observations and hydrologic studies.

In addition, remedial measures are recommended for implementation by the owner, within 12 months of receipt of this Phase I Inspection Report, to improve overall conditions. These measures, in general, are as follows:

- Programs for observing and monitoring seepage
- Repairs to embankments and appurtenant structures
- Programs for operation, maintenance and inspection

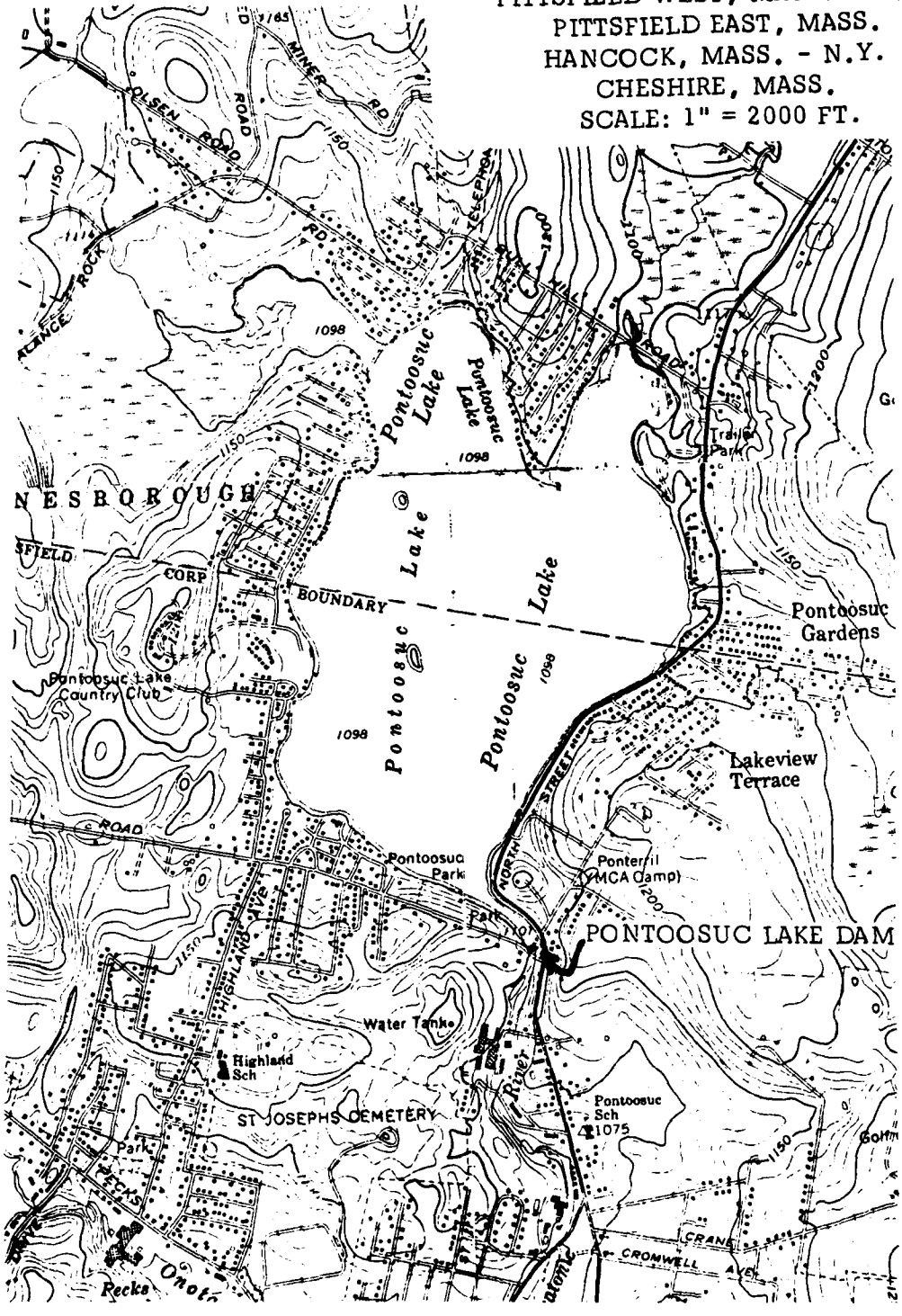
Eugene O'Brien P.E.
New York No. 29823

(1) GENERAL OVERVIEW OF MASONRY DAM AND SPILLWAY



VICINITY MAP
PONTOOSUC DAM

QUADRANGLES
PITTSFIELD WEST, MASS. - N.Y.
PITTSFIELD EAST, MASS.
HANCOCK, MASS. - N.Y.
CHESHIRE, MASS.
SCALE: 1" = 2000 FT.



TOPOGRAPHIC MAP
PONTOOSUC LAKE DAM AND RESERVOIR

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
HOUSATONIC RIVER BASIN
INVENTORY NO. MA 00309
PONTOOSUC LAKE DAM
CITY OF PITTSFIELD
BERKSHIRE COUNTY, COMMONWEALTH OF MASSACHUSETTS

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tippetts-Abbett-McCarthy-Stratton has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Tippetts-Abbett-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0298 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenances

Pontoosuc Lake Dam is a gently arched stone masonry and concrete gravity dam about 125 feet long, at least 19 feet high with a dropped center spillway 80 feet long, 4 feet high. The downstream vertical face is partially gunited. Tne upstream face of the dam is formed by a concrete wall which was placed subsequent to the construction of the masonry dam. The non-overflowing abutment sections of the dam and the downstream stone masonry wing walls are gunited. The widths of the sill and base are about

8 feet and 15 feet, respectively. Discharges over the spillway flow in a riprap lined channel, under an arched bridge (Hancock Road) and into the West Branch of the Housatonic River.

A low level intake structure and sluiceway are located on the west abutment. Discharges are made through a 9 feet by 6 feet sluice gate which is manually controlled by a center rising screw type gate mechanism located in a wooden gatehouse. Discharges through the sluiceway pass under Hancock Road through a 7-foot diameter steel pipe (flume), which enlarges to 8 feet at the downstream end, into the natural channel. The east side of the channel has a low concrete retaining wall capped with wood lagging. The channel passes through a demolished concrete weir, once used to form a supply pool for a textile mill, and into the main downstream channel.

b. Location

The dam is located at the intersection of North Street (U.S. Route 7) and Hancock Road in the northern section of Pittsfield, Massachusetts, on the West Branch of the Housatonic River.

c. Ownership

Pontoosuc Lake Dam is owned by the County of Berkshire. The day-to-day operation and maintenance are provided by the County Engineer, Office of the Engineering Department, County of Berkshire.

d. Purpose of Dam

The impoundment provided by the dam is for recreational purposes.

e. Design and Construction History

Original design and construction records are not available. It is reported that the dam was built in approximately 1865. In 1962, alterations were made to the dam, the wing walls, the head walls and the flume; the designer of the alterations is unknown. It is reported that guniting of the structure was carried out in 1970; there are no records of who performed this work.

f. Normal Operating Procedures

Water releases from Pontoosuc Lake are either over the spillway or through the low level sluiceway. It is reported that discharges are maintained so as to provide downstream flows prescribed by the Department of Natural Resources. The requirements are such that the lake level normally is maintained at slightly above spillway crest in the summer and is drawn down during the winter.

g. Size Classification

The dam is less than forty feet high but has maximum storage capacity of more than 1000 acre-feet. It is, therefore, classified as an "intermediate" size dam.

h. Hazard Classification

The dam is in a "high" hazard potential category because there are, a short distance downstream from the dam, about 10 homes and 2 or 3 business establishments. Further downstream,the area is completely developed with many homes and businesses. In the event of a failure, the resulting flood wave would cause substantial loss of life and property.

For details on selection of the hazard potential category see Section 5.6.

i. Operation

The individual responsible for the day-to-day operation of the dam is:

Mr. William A. Heaphy	Tel. No.:
County Engineer	(Home) 413-443-1723
116 Brighton Avenue	(Office) 413-447-7156
Pittsfield, Mass. 01201	

1.3 PERTINENT DATA

a. Drainage Area

The drainage basin contributing to the Pontoosuc Lake totals 22.7 square miles, and is mainly undeveloped forest reserves with urban development centered around the lake and along U.S. Route 7. The physical features consist of steep hills and ridges with little natural storage. The basin is rectangular in shape with a length to width ratio of about 2.4. The elongated shape of the basin, and its general North/South orientation, may be expected to cause elongated flood hydrographs.

b. Discharge at Damsite

Discharges at the damsite are over an uncontrolled spillway and through a controlled low level outlet.

No head-discharge relation is available for the spillway. For estimating the discharge capacity, it is assumed that the spillway acts as a trapezoidal weir with a coefficient of 3.09. The computed capacity is 1980 cfs at a head of 4 feet, which is the height of the end walls above the crest.

The low level outlet is a 7-foot diameter steel pipe. The exact invert elevation is unknown, but is estimated to be about 15 feet below the spillway crest. The computed maximum discharge is 720 cfs.

c. Elevation (feet above MSL)

Top of dam 1102±

Maximum pool-design surcharge	1102±
Maximum pool-test flood surcharge (PMF)	1112.7
Full flood control pool	Not Applicable
Recreation pool	1098±
Spillway crest (gated)	Not Applicable
Upstream portal invert diversion tunnel	Not Applicable
Downstream portal invert diversion tunnel	Not Applicable
Streambed at centerline of dam	1083.5±
Maximum tailwater	Unknown

d. Reservoir (miles)

Length of maximum pool	1.95±
Length of recreation pool	1.35±
Length of flood control pool	Not Applicable

e. Storage (acre-feet)

Recreation pool	Unknown
Flood control pool	Not Applicable
Design surcharge	Unknown
Test flood surcharge (PMF)	12197
Top of dam	5000

f. Reservoir Surface (acres)

Top of dam	788
Test flood pool (PMF)	1048(est)
Flood control pool	Not Applicable
Recreation pool	527
Spillway crest	527

g. Dam

Type	Stone Masonry and Concrete
Length	125± feet
Height	19 feet (minimum)
Top width	8 feet (concrete and stone sill combined)
Side slopes - U/S	1 (V): 0.8 (H)
D/S	Vertical
Zoning - D/S face	Stone Masonry
U/S face	Concrete
Impervious core	None
Cutoff	Unknown
Grout curtain	Unknown
Other	None

h. Diversion and Regulating Tunnel

Type	Not Applicable

Length	Not Applicable
Closure	Not Applicable
Access	Not Applicable
Regulating facilities	Not Applicable

i. Spillway

Type	Trapezoidal
Length of weir	80± feet
Crest elevation	1098± feet
Gates	None
U/S channel	None
D/S channel	Natural channel; slopes riprapped
General	None

j. Regulating Outlet

The regulating outlets consist of an uncontrolled spillway and a controlled low level outlet.

The spillway is a gently curved arch, about 80 feet in length, 4 feet high, trapezoidal in cross section, with the crest at El 1098±.

The low level outlet is a 7-foot diameter steel pipe. Discharges are controlled by an operating 9 foot by 6 foot sluice gate. The invert elevation is unknown but is estimated to be about 15 feet below the spillway crest.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

There are no design data, drawings or specific memoranda available covering the construction of the original dam or subsequent changes to the dam except for a copy of a drawing showing the 1962 alterations. (See Appendix).

There is no information on subsurface conditions available.

2.2 CONSTRUCTION RECORDS

There are no construction records available.

2.3 OPERATION RECORDS

A record of the reservoir level is kept at the County Engineer's Office. No written record of the sluice gate operation is kept.

2.4 EVALUATION OF DATA

a. Availability

Existing information was made available by County Engineer, The Office of the Engineering Department, Berkshire County; Department of Environmental Quality Engineering, Division of Waterways, Boston, Mass.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity

In general, the information obtained from the as-built drawing showing the alterations and the personal interviews is consistent with observations made during the inspection and therefore considered reliable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of Pontoosuc Lake Dam was made on 23 June 1978. The weather was sunny, temperature 75° to 80°F. The last rainfall, a heavy thunderstorm of about four hours duration, occurred two days before. At the time of the inspection the lake level was about 2 inches above the spillway crest.

b. Dam and Spillway

At the time of the inspection, water was spilling over the dam which made it impossible to observe whether any seepage was occurring through the structure; however, one or two locations on the downstream face were suspect. The condition of the sill is generally good with little apparent erosion. (See Photograph No. 2) The downstream stone masonry face is in generally good condition. It was reported that the gunite on the downstream face was removed for esthetic reasons; some gunite still adheres to the downstream face. A few stones have undergone some horizontal displacement, which apparently occurred prior to the guniting, since remnants of the gunite do not exhibit any cracking along the contours of the displaced stones.

The presence of tailwater in the plunge pool made it impossible to observe the condition of the base of the dam or the existence of any underseepage.

With the exception of one log caught on the sill, there was no debris on the upstream side of the dam.

c. Appurtenant Structures

The upstream concrete training walls are in generally good condition with only minor spalling of the east wall.

The downstream walls are in fair condition. The gunite surfaces are cracked in several places; there is minor seepage from a few cracks. At the base of the west wall, there is seepage at the junction of the wing wall, headwall and natural ground surface as well as evidence of some erosion of the gunite and natural ground. There is a piece of timber exposed at this seepage location (See Photograph Nos. 10 & 12). The original purpose of the timber could not be ascertained. Along the entire base of the east wing wall there is heavy seepage which has eroded away some of the gunite and soil. It appears an attempt has been made to control the seepage by the insertion into the wall of a pair of one-inch diameter rubber hoses to act as weep holes. No water was observed emerging from these holes (See Photograph Nos. 11 & 13). In the vicinity of the walls on both downstream abutments,

there are trees and heavy ground cover.

There are several loose, large concrete slabs on the upstream side of the west abutment. These are probably remnants of an old wall which has been removed and replaced.

d. Regulating Gates

The sluice gate operating mechanism is well maintained, in good condition and easily operable. (See Photograph No. 4). The wood gatehouse is in good condition, freshly painted and appears to be relatively new. The trash rack to the sluiceway appears to be in good condition with some minor surface debris in evidence. (See Photograph No. 3).

The full length of the steel flume leading from the sluiceway could not be investigated; the visible portion of the downstream end is rusty but otherwise in good condition. The concrete headwall is also in good condition with very minor spalling. The invert of the flume is filled with cobble, gravel and minor debris. (See Photograph No. 7).

e. Abutments

Except for the seepage noted above, no other seepage or unusual condition was apparent at the abutments.

f. Downstream Channel

The downstream channel of the spillway is the West Branch of the Housatonic River. The channel, directly below the spillway, is approximately 100 feet wide narrowing to about 25 feet at the arch bridge at Hancock Road. The distance from the dam to the arch is about 150 feet and the arch is 28 feet long. The floor of the channel consists of cobble and boulders. Located about 40 feet from the dam is a low water-deposited dike consisting of gravel, cobbles and boulders. It forms a sill for the plunge pool, which is about 3 feet deep. The dike has been breached approximately at mid-length; there is some debris immediately downstream of the plunge pool. The west bank of the channel is covered with dumped riprap to about 10 feet up the slope.

Downstream from the bridge, the channel is trapezoidal in section, about 30 feet wide, and lined on both sides with hand-placed, sound stone. There are some overhanging trees and some minor debris, however, they do not impede discharges. (See Photograph Nos. 5 & 6).

The downstream channel leading from the flume has a natural bed about 15 feet wide. The west slope is natural but the east slope is retained by a vertical concrete wall topped with 4± foot high wood lagging, anchored by "U" bolts around 2-inch diameter vertically driven steel rods. There are trees overhanging the channel, and several fallen trees and debris in the channel. The low discharge, at the time of inspection, did not

appear to be affected by these conditions. (See Photograph Nos. 8 & 9).

g. Reservoir Area

In the vicinity of the dam, there is no evidence of potentially unstable slopes or other unusual conditions which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in SECTION 7.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

Operating procedures for the project are not formally established but are based on the experience of the operating personnel and criteria set forth by the Department of Conservation. The lake level is generally maintained at or slightly above spillway crest during the summer and drawn down during the winter.

4.2 MAINTENANCE OF DAM

There is no formal maintenance manual for the project. Maintenance is carried out as needed. For example, it is reported that the County Engineer is planning to have repair work done to rectify the seepage noted in Section 3.1.

Inspections are carried out daily by personnel from the County Engineer's Office. In addition, there is a statewide program of inspection established several years ago by the Department of Environmental Quality Engineering, Division of Waterways, and prior to this program, the County of Berkshire conducted inspections. Copies of their last reports dated 5 October 1976 and 31 October 1968, respectively, are included in the Appendix.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities. Maintenance is carried out as needed.

4.4 WARNING SYSTEMS IN EFFECT

There is no warning system in effect other than telephone communication between the County Engineer's Office and the Office of the Mayor, Pittsfield.

4.5 EVALUATION

The maintenance and operating procedures for the dam and appurtenant structures are considered deficient, in some aspects. Measures to improve these deficiencies are given in SECTION 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE AREA CHARACTERISTICS

The drainage basin contributing to the Pontoosuc Lake totals 22.7 square miles, and is mainly undeveloped forest reserves with urban development centered around the lake and along U.S. Route 7. The physical features consist of steep hills and ridges with little natural storage. The basin is rectangular in shape with a length to width ratio of about 2.4. The elongated shape of the basin and its general north/south orientation may be expected to cause elongated flood hydrographs with relatively small flood peaks.

5.2 SPILLWAY CAPACITY

The spillway is a gently curved arch, uncontrolled and about 80 feet in length. The cross section of the spillway is trapezoidal. The upstream face is sloping at 1 (V):0.8 (H). The crest width is 2 feet. There is a 6 feet wide transition at a slope of 1 (V):5 (H) between the crest and the downstream face which is vertical. No head-discharge relation was available, therefore, it was necessary to estimate the discharge characteristics. It was assumed that the spillway would act as a trapezoidal weir with a coefficient of 3.09. The computed spillway capacity at a head of 4.0 feet, which is the height of the endwalls, is 1,980 cfs (87 cfs/square mile).

In addition to the spillway, there is a 7.0 feet diameter low level outlet with a computed maximum discharge capacity of 720 cfs, making the total discharge capacity equal to 2,700 cfs.

5.3 RESERVOIR CAPACITY

The maximum capacity of the Pontoosuc reservoir is given as 5,000 acre-feet including surcharge storage. [1/] It is estimated that the surcharge storage, above the spillway crest (El 1098) is 2,372 acre-feet which is equivalent to approximately 2 inches of runoff over the drainage area.

5.4 FLOODS OF RECORD

No flood discharge records are available. However, precipitation recorded at Pittsfield indicates a storm of 7.45 inches in two days, December 30 and 31, 1948. A maximum discharge for the period of record from May 1913 to September 1970 was 12,200 cfs, measured on January 1, 1949, at the Housatonic River Gaging Station near Great Barrington (Drainage

1/ National Program of Inspection of Dams, U.S. Corps of Engineers, Vol. III, May 1975

Area = 280 square miles).

5.5 DESIGN FLOOD

Based on the size and hazard classification, and the U. S. Corps of Engineers recommended guidelines for safety inspection of dams, the Probable Maximum Flood was selected as the test flood. The Probable Maximum 6 hour rainfall over 23 square miles for the Pontoosuc Lake area was taken from Weather Bureau Sources 2/ then distributed, in a probable storm sequence, as indicated in a publication of the World Meteorological organization 3/.

Based on the Soil Conservation Service's curve number method the rainfall excess was determined. Triangular unit hydrographs were developed for the Secum and Town Brook sub-basins and subsequently used to compute their PMF hydrographs. The test flood inflow hydrograph was formed by adding the sub-basin hydrographs to the runoff resulting from the rain falling directly on the lake surface, and resulted in a peak inflow discharge of 67,550 cfs.

5.6 OVERTOPPING POTENTIAL

The potential of the water overtopping the dam was investigated on the basis of the available surcharge storage and spillway discharge capacities to meet a potential emergency inflow. It was assumed that the lake level at the start of the flood inflow was at El 1098 (spillway crest). The PMF caused the level of the lake to rise to a maximum elevation of 1112.66, 10.66 feet above the top of the dam. The peak outflow discharge was 18,077 cfs or 9 times the spillway capacity. The one half PMF produced a maximum lake level elevation of 1106.8 and a peak discharge of 7831 cfs, 4 times the spillway capacity.

The low level conduits were assumed inoperable during the test flood evaluation.

In order to estimate the downstream dam failure hydrograph, the U. S. Corps of Engineers "Rule of Thumb" guidance was used. The estimate assumes: (a) the reservoir surface is at the top of the dam at

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2/ Seasonal Variation of the Probable Maximum Precipitation East of the 105° Meridian for areas from 10 to 1,000 Square miles and Durations of 6, 12, 24 and 48 hours, Hydrometerological Report No. 33, 1956.

3/ Manual for Estimation of Probable Maximum Precipitation, World Meteorological Organization, Operational Hydrology Report No. 1973.

the time of the breach, (b) a breach of 40% of the dam length occurs (50 feet) and (c) the channel has an average roughness coefficient (n) of 0.07. It is estimated that at a selected section, 3000 feet downstream of the dam, the peak flood wave discharge is 6860 cfs with a wave height of about 9.5 feet. The visual inspection corroborates the information shown on the U.S.G.S. Quadrangle Sheet for Pittsfield East, Mass., which indicates, at this section, about 10 houses and two or three large business establishments at or about El 1050. These buildings would probably be destroyed or damaged by the estimated flood wave.

5.7 EVALUATION

In view of the fact that the abutments will be overtopped by about 10.7 feet under the Probable Maximum Flood, it is considered that the spillway is seriously inadequate from a hydraulic and hydrologic viewpoint.

However, it is believed that the peak flow is very conservative, and that to accurately evaluate the relation between the Pontoosuc Dam spillway capacity and the design flood, it would be necessary to develop a complete hydrograph and route the flood through the available storage in the basin.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any serious structural problems with respect to the dam. The observed deficiencies described in SECTION 3 require attention; measures to correct these deficiencies are given in SECTION 7.

b. Design and Construction Data

No design computations or other data pertaining to the structural stability of the dam have been located. On the basis of the structures, the visual inspection, as well as engineering judgement, the dam appears to be structurally adequate at the present time.

c. Operating Records

There are no operating records. There are no records or reports of any operational problems which would affect the stability of the dam.

d. Post-Construction Changes

It is reported that the dam was built sometime around 1865. There are no records of any modifications to the dam prior to 1952. In 1952 alterations were made to the dam, the head walls, the wing walls and the flume, but there is no record of the designer or contractor. In 1970, the head walls, wing walls and dam were gunited; no records of this work are available.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

Phase I investigation of Pontoosuc Lake Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the outlet works and dam, the project is considered to be in fair condition. The project, however, does have a number of deficiencies and unknown factors whose causes and circumstances are not sufficiently defined to assess the performance of the dam under flood conditions. In addition, the assessable deficiencies, if not thoroughly remedied and monitored, have the potential for developing into hazardous conditions.

Based on the size and hazard classification, and the guidelines set forth by the U. S. Corps of Engineers for safety inspection of dams, the Probable Maximum Flood was selected as the test flood. The Probable Maximum 6 hour rainfall over 23 square miles for the Pontoosuc Lake area was taken and distributed in a probable storm sequence.

The Soil Conservation Service's curve number method was used to determine the rainfall excess. Triangular unit hydrographs were developed for the Secum and Town Brook sub-basins and subsequently used to compute their PMF hydrographs. The test flood inflow hydrograph was formed by adding the sub-basin hydrographs to the runoff resulting from the rain falling directly on the lake surface, and resulted in a peak inflow discharge of 67,550 cfs.

The adequacy of the spillway was tested by routing the flood through the reservoir using a computerized routing technique. It was assumed that the lake level at the start of the flood inflow was at El 1098 (spillway crest). The PMF caused the level of the lake to rise to a maximum elevation of 1112.66, 10.66 feet above the top of the dam. The peak outflow discharge was 18,077 cfs or 9 times the spillway capacity. The one half PMF produced a maximum lake level elevation of 1106.8 and a peak discharge of 7831 cfs, 4 times the spillway capacity.

The low level conduits were assumed inoperable during the test flood evaluation.

Since the dam is expected to be overtopped with an inflow equal to the PMF and 1/2 PMF, it is considered that the spillway is seriously inadequate from a hydraulic and hydrologic standpoint.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

Several of the observed deficiencies require short term corrective measures, others may be corrected as part of a regular maintenance program. A listing of recommended improvements is given in the following paragraphs.

d. Necessity for Additional Investigations

Although the dam does not appear to be in imminent danger under present conditions, additional investigations need to be undertaken to determine: subsurface conditions, soil parameters, elevations of base of dam and walls and the nature of seepage conditions. Additional hydrologic studies also should be performed. These investigations should include, but not necessarily be limited to, subsurface exploration and testing, surveys, piezometric observations and the collection of hydrologic data at the damsite.

7.2 RECOMMENDATIONS

It is recommended that the owner, within 12 months of receipt of this report, retain a competent consulting engineer to conduct the following:

1. A subsurface exploration program consisting of borings to identify foundation soils. Laboratory testing of disturbed and undisturbed samples should be performed to determine the parameters of the foundation materials. Depending on the foundation condition encountered by the borings, it may be necessary to install piezometers. The results of these investigations should then be utilized in stability analyses and an evaluation of foundation performance during design flood conditions.

2. Hydrologic studies to accurately evaluate the relation between the Pontoosuc Dam spillway and a design flood. A complete hydrograph has to be developed and the resulting flood routed through the available storage of the basin.

3. A systematic program of monitoring the pattern and quantity of seepage at the base of the walls.

4. Inspection of the base and downstream face of the dam as soon as the lake level is below the spillway crest.

7.3 REMEDIAL MEASURES

a. Alternatives

The results of the additional investigations recommended above may indicate alternatives which will be needed to provide discharge adequacy under flood conditions. These alternatives can only be determined after the completion and evaluation of the additional investigations.

b. Operating and Maintenance Procedures

It is recommended that the following measures be undertaken by the owner within 12 months after receipt of this Phase I Inspection Report:

1. A formal program of operation and maintenance of the project should be established.

2. Round the clock surveillance should be provided during periods of unusually heavy precipitation.

3. A formal warning system should be developed with local officials for alerting downstream residents in case of emergency.

4. Rebuild plunge pool dike.

5. To remove runoff more efficiently in the vicinity of the head and wing walls, consideration should be given to the construction of toe drains or paving of the slope with riprap or asphalt.

6. Rebuild, where necessary, riprap protection along channel banks.

7. Remove and haul away all debris located in the downstream and flume channels and at the trash rack.

8. Remove and haul away concrete slabs in the vicinity of the gatehouse.

9. Cut and remove the overhanging trees in vicinity of both channels.

VISUAL INSPECTION CHECK LIST

APPENDIX A

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT PONTOOSUC DAM

DATE 6-23-78

TIME 11.00 AM

WEATHER Sunny 75 to 80°F

W.S. ELEV. 1098± U.S.

W.S. ELEV. (TAIL WATER) 1083.5± D.S.

PARTY:

1. Harvey S. Feldman
2. Jyotindra H. Patel
3.
4.
5.
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	All project features inspected by Party Members		
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Hydraulic System None

Service Gates 9ft x 6ft sluice gate in good operating condition; and screw rising stem manually operated in good condition.

Emergency Gates —

Lightning Protection System —

Emergency Power System —

Wiring and Lighting System —

PERIODIC INSPECTION CHECK LIST

PROJECT PONTOOSUC LAKE DAM DATE 6-23-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - TRANSITION AND CONDUIT STEEL FLUME

General Condition ~~of Concrete~~ The condition is generally good inportion visible at outlet.

Rust or Staining of ~~Concrete~~ Steel minor rust & staining

Spalling —

Erosion or Cavitation —

Cracking —

Alignment of Monoliths —

Alignment of Joints —

Numbering of Monoliths —

Miscellaneous The steel flume at the outl. l- partially filled upto springline with cobbles.

PERIODIC INSPECTION CHECK LIST

PROJECT PONTOOSUC LAKE DAM DATE 6-23-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - [redacted]

OUTLET CHANNEL OF FLUME

General Condition of Concrete west wall of channel spalled; and upper portion of wall wooden lagging retained by 1/2" steel rod. Condition of retaining wall is in fair condition

Spalling See note above.

Erosion or Cavitation —

Visible Reinforcing —

Any Seepage or Efflorescence —

Condition at Joints —

Drain Holes —

Channel

Loose Rock or Trees Overhanging Channel Few trees over hang channel.

Condition of Discharge Channel Loose stones and cobbles on floor of channel otherwise in good condition.

PERIODIC INSPECTION CHECK LIST

PROJECT PONTOOSUC LAKE DAM DATE 6-23-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

a. Approach Channel None See intake structure

General Condition _____

Loose Rock Overhanging Channel _____

Trees Overhanging Channel _____

Floor of Approach Channel _____

b. Weir and Training Walls

General Condition of ~~Concrete~~ Gunite Masonry Weir generally in good condition; Upstream training walls are also in good condition. Downstream training walls in fair condition; and cracked at several places

Rust or Staining None observed.

Spalling Upstream East training wall minor spalling.

Any Visible Reinforcing None

Any Seepage or Efflorescence Impossible to observed the seepage at the base of the dam; Minor seepage from some cracks. For other comments see next page.

Drain Holes There are two 1 inch diameter rubber hoses inserted into wall.

c. Discharge Channel

General Condition Generally in Good Condition

Loose Rock Overhanging Channel None Observed

Trees Overhanging Channel Some overhanging trees but do not impede flow

Floor of Channel Consists of Cobble and boulders.

Other Obstructions Some minor debris; 150 ft downstream of weir there is 28 ft long arch.

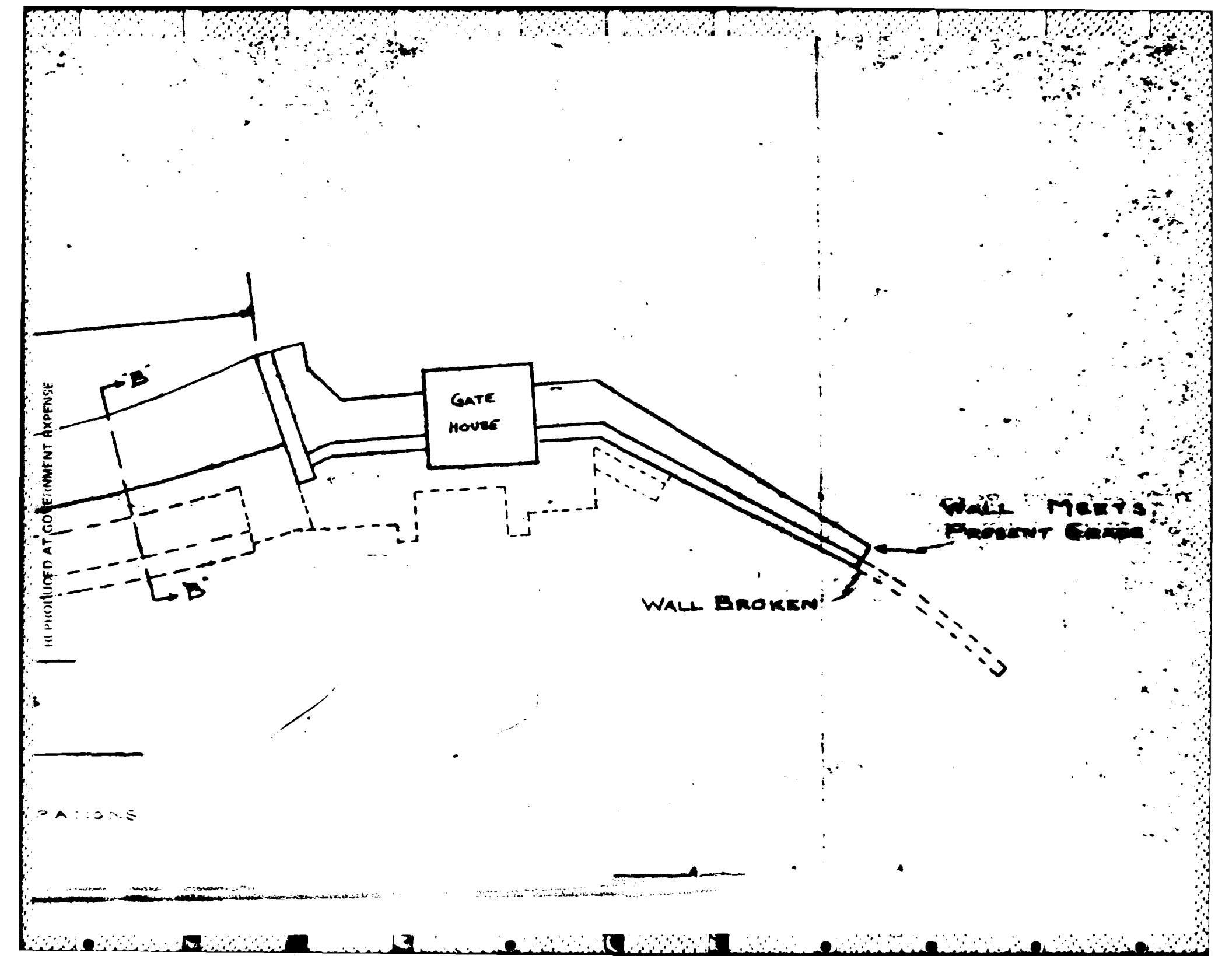
Additional Comments:

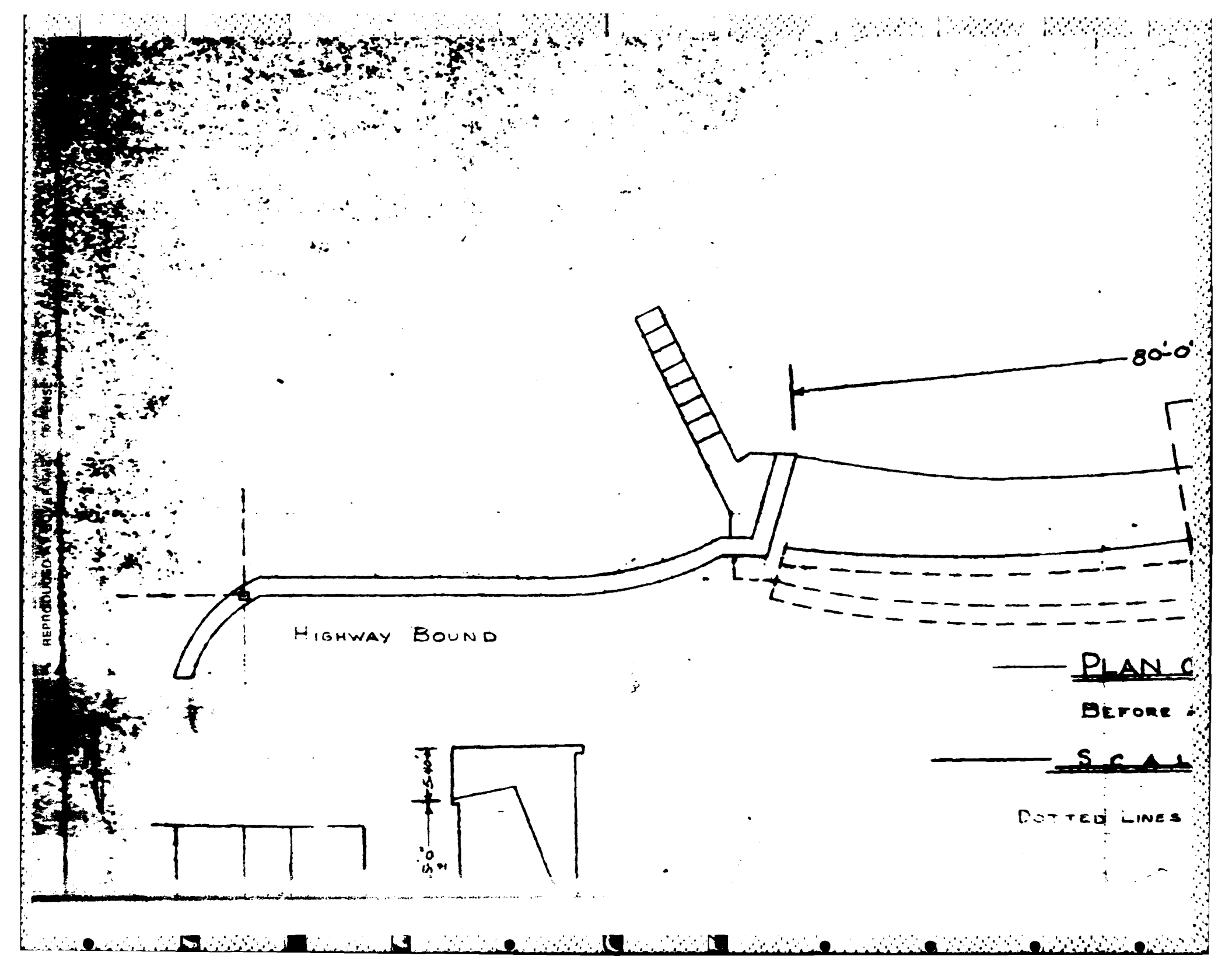
b. Any seepage or Efflorescence. At time of inspection presence of tailwater in the plunge pool made it impossible to observed the underseepage. At base of Downstream west training wall there is a seepage at the junction of wing wall, headwall and natural ground surface as well as evidence of some erosion of gunite and natural ground. Also there is timber exposed at this seepage location. Downstream East training wall there is heavy seepage along the entire base Also some of gunite and soil has eroded away

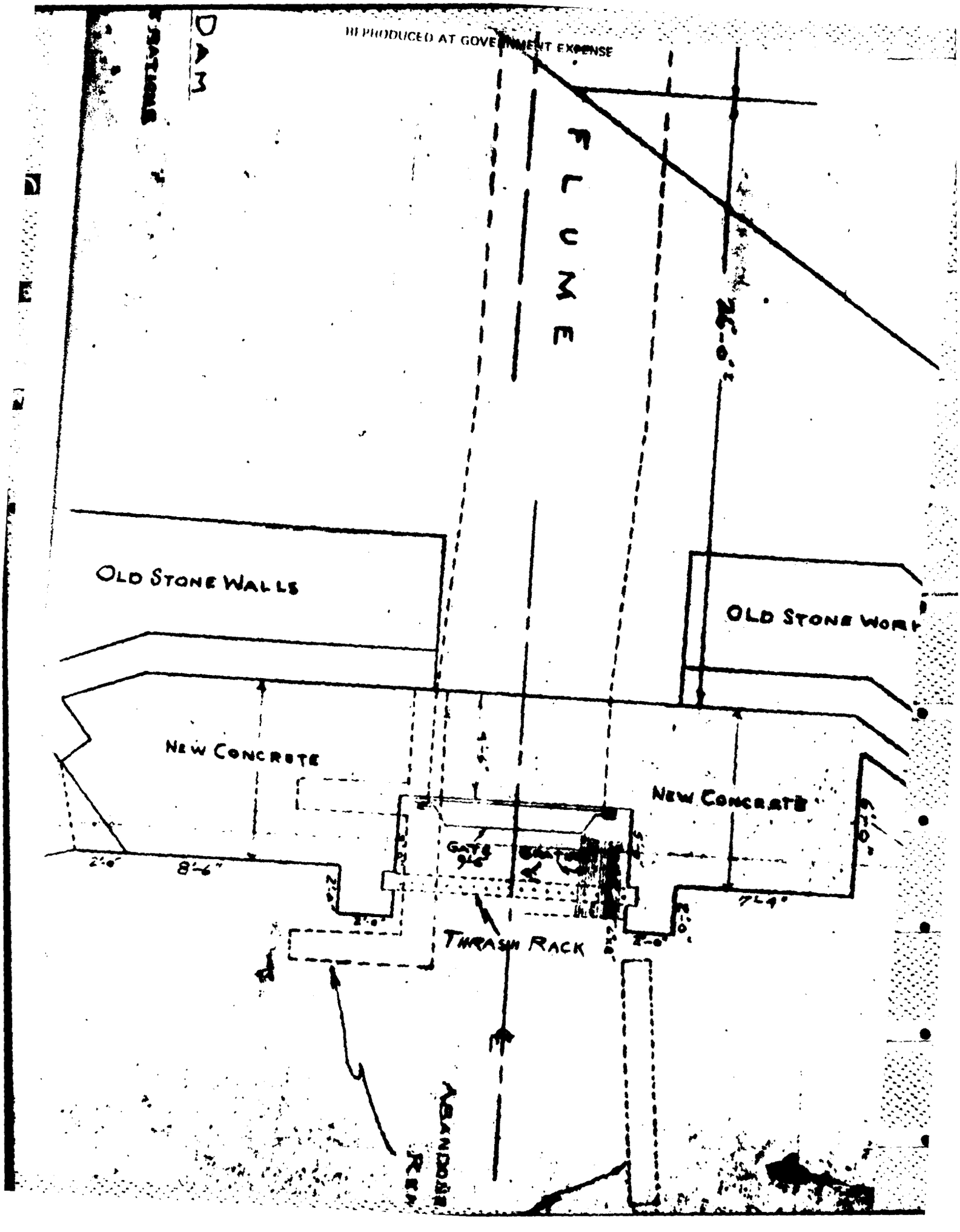
d Miscellaneous. Downstream face of weir wall a few stones have undergone displacement which could have occured prior to the guniting.

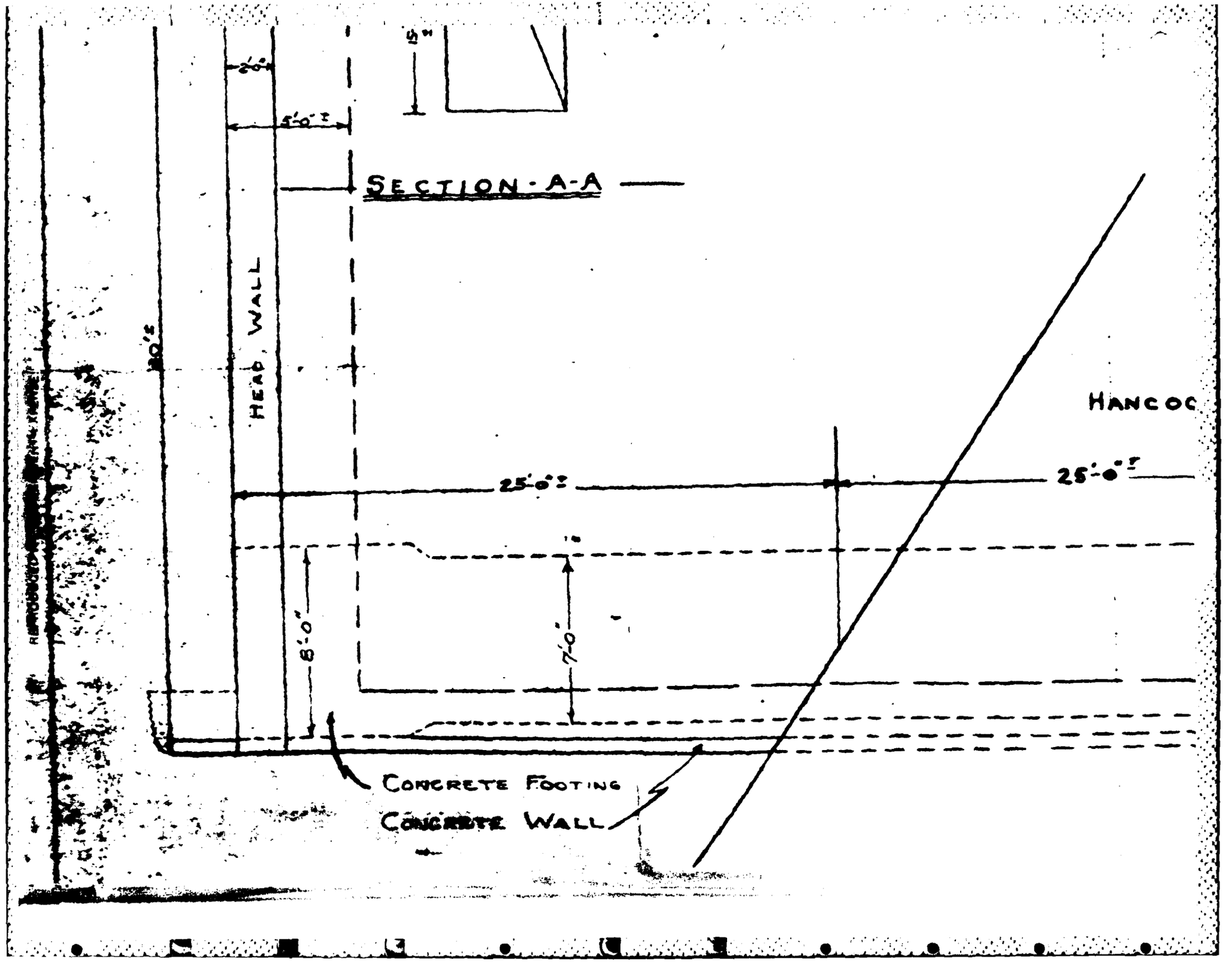
DRAWINGS AND INSPECTION REPORTS

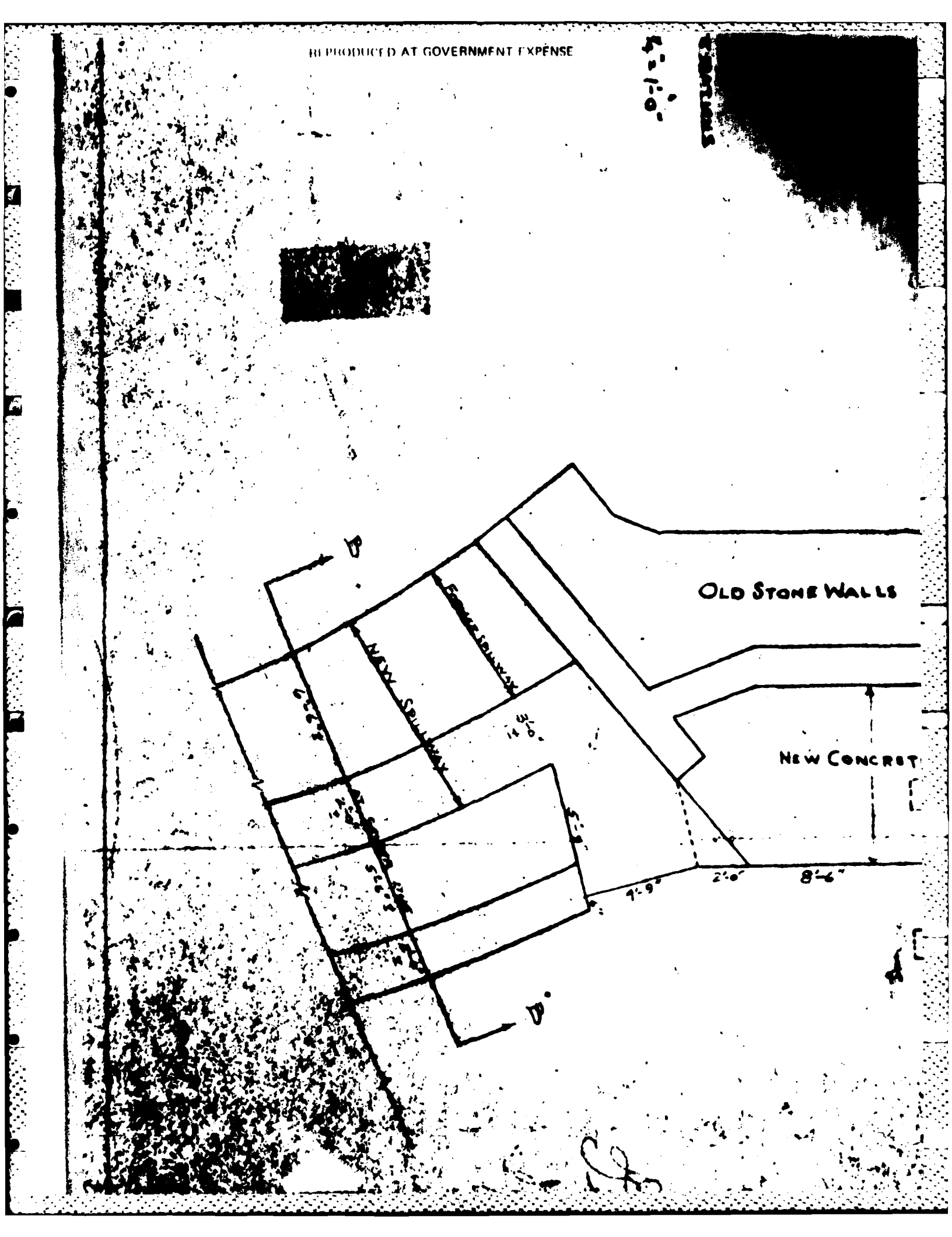
APPENDIX B

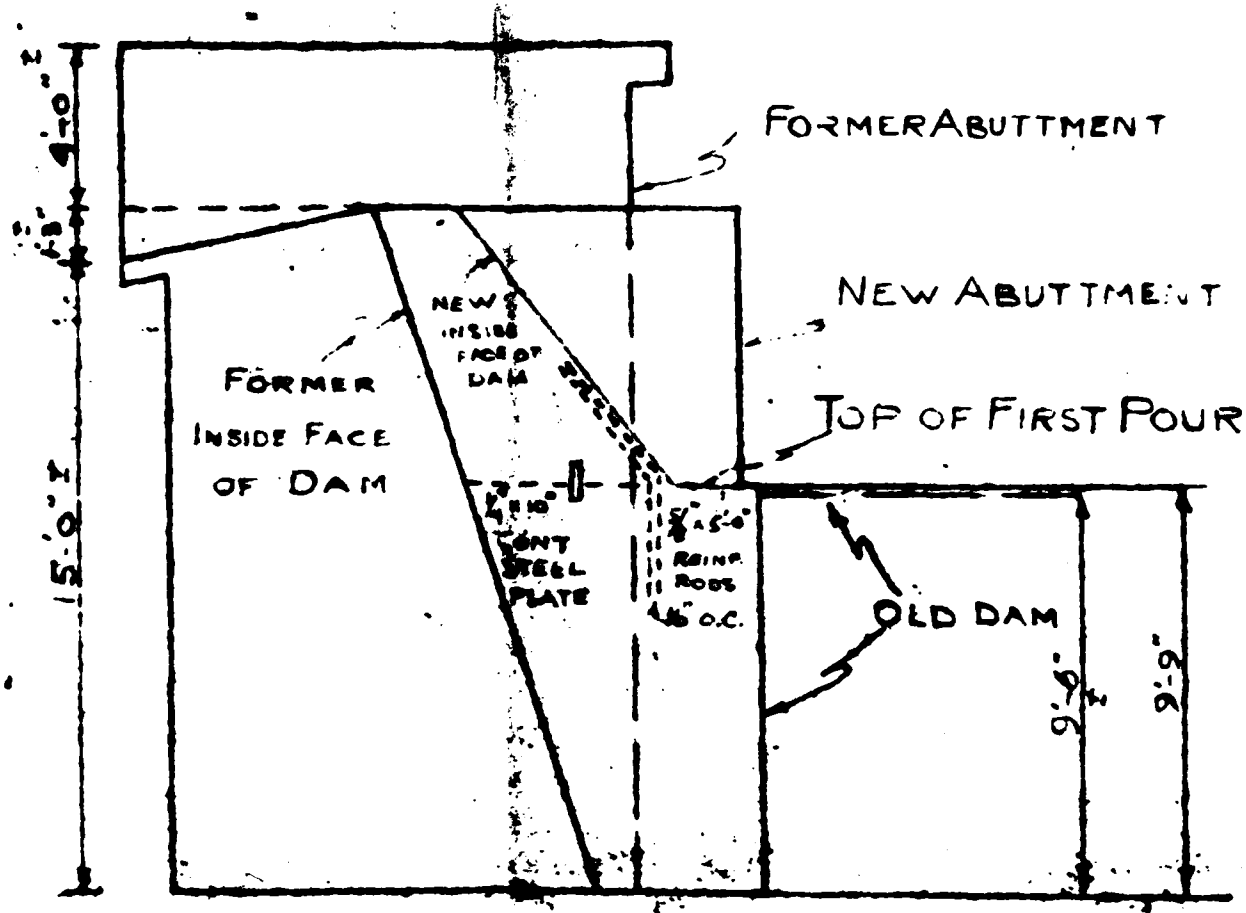

B
B
GATE
HOUSE
WALL MEETS
PRESENT GRADE
WALL BROKEN


80'-0"
HIGHWAY BOUND
PLAN
BEFORE
SCALE
DOTTED LINES


REPRODUCED AT GOVERNMENT EXPENSE
DAM
FLUME
OLD STONE WALLS
OLD STONE WORK
NEW CONCRETE
NEW CONCRETE
TRASH RACK
ABANDONED


SECTION - A-A
HEAD WALL
25'-0"
25'-0"
8'-0"
7'-0"
CONCRETE FOOTING
CONCRETE WALL
HANCOC




FORMER ABUTTMENT
NEW ABUTTMENT
TOP OF FIRST POUR
NEW INSIDE FACE OF DAM
FORMER INSIDE FACE OF DAM
LIGHT STEEL PLATE
REINF RODS 16" O.C.
OLD DAM
4'-0"
15'-0"
9'-9"
9'-9"

SECTION B-B

BERKSHIRE COUNTY
MASSACHUSETTS

OFFICE OF THE
ENGINEERING DEPARTMENT
COURT HOUSE
PITTSFIELD, MASS. 01201

WILLIAM A. HEAPHY,
COUNTY ENGINEER
ROBERT J. SAULNIER,
ASS'T. COUNTY ENGINEER

413-447-7156

June 15, 1978

Tippetts-Abett-McCarthy-Stratton
Engineers and Architects
345 Park Avenue
New York, New York 10022

Att'n: H. S. Feldman

Dear Sir:

Enclosed herewith is a copy of the latest dam reports that I have pertaining to Pontoosuc Lake in Pittsfield, Ashmere Lake in Hinsdale and Windsor Lake in North Adams. As you probably know, the Commonwealth of Massachusetts took over inspection of dams from the county about eight years ago.

Also, I am enclosing a print of the Pontoosuc Dam that we had in our files. There is also a copy of a report of inspection of dams made in 1907 by one Mr. Joyner of the Massachusetts Highway Commission, which includes Ashmere Lake. This report, which I realize is very old, may be of little value to you.

I have searched the records here but can find nothing further on the aforementioned dams.

Very truly yours,

William A. Heaphy

William A. Heaphy
County Engineer

WAH/dd

Enclosure

L-168

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/~~Town~~ PITTSFIELD. Dam No. 1-2-236-9.

Name of Dam Pontoosic. Inspected by: RDJorden-RDSpaniol

Date of Inspection 10-5-76.

2. Prev. Inspection X.

Owner/s: per: Assessors_____.

Reg. of Deeds_____. Pers. Contact_____.

1. County of Berkshire | City Hall | Pittsfield, MA
   Name | St. & No. | City/Town | State | Tel. No.

2. _____
   Name | St. & No. | City/Town | State | Tel. No.

3. _____
   Name | St. & No. | City/Town | State | Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

   Name | St. & No. | City/Town | State | Tel. No.

4. No. of Pictures taken X.

5. Degree of Hazard: [if dam should fail completely]*

   1. Minor_____. 2. Moderate_____.

   3. Severe_____. 4. Disastrous X.

   *This rating may change as land use changes [future development]

6. Outlet Control: Automatic_____. Manual X.

   Operative X yes:_____no.

   Comments:_____

   _____

Upstream Face of Dam: Condition:

1. Good X. 2. Minor Repairs_____.

3. Major Repairs_____. 4. Urgent Repairs_____.

Comments:_____

DAM NO. 1-2-236-9

Downstream Face of Dam: Condition: 1. Good X. 2. Minor Repairs___.
3. Major Repairs___ 4. Urgent Repairs___.

Comments:_____

_____

9.

Emergency Spillway: Condition: 1. Good_____. 2. Minor Repairs_____.
3. Major Repairs_____.4. Urgent Repairs_____.

Comments:_____

_____

_____

10.

Water level @ time of inspection: 0.1' ft. above____. below X.
top of dam_____.
principal spillway spillway.
other_____.

11.

Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment NONE
Animal Burrows and Washouts "
Damage to slopes or top of dam "
Cracked or Damaged Masonry "
Evidence of Seepage "
Evidence of Piping "
Erosion "
Leaks "
Trash and/or debris impeding flow "
Clogged or blocked spillway "
Other "

DAM NO. 1-2-236-9

Remarks & Recommendations: [Fully Explain] PREVIOUS INSPECTION DATE: January 31, 1974

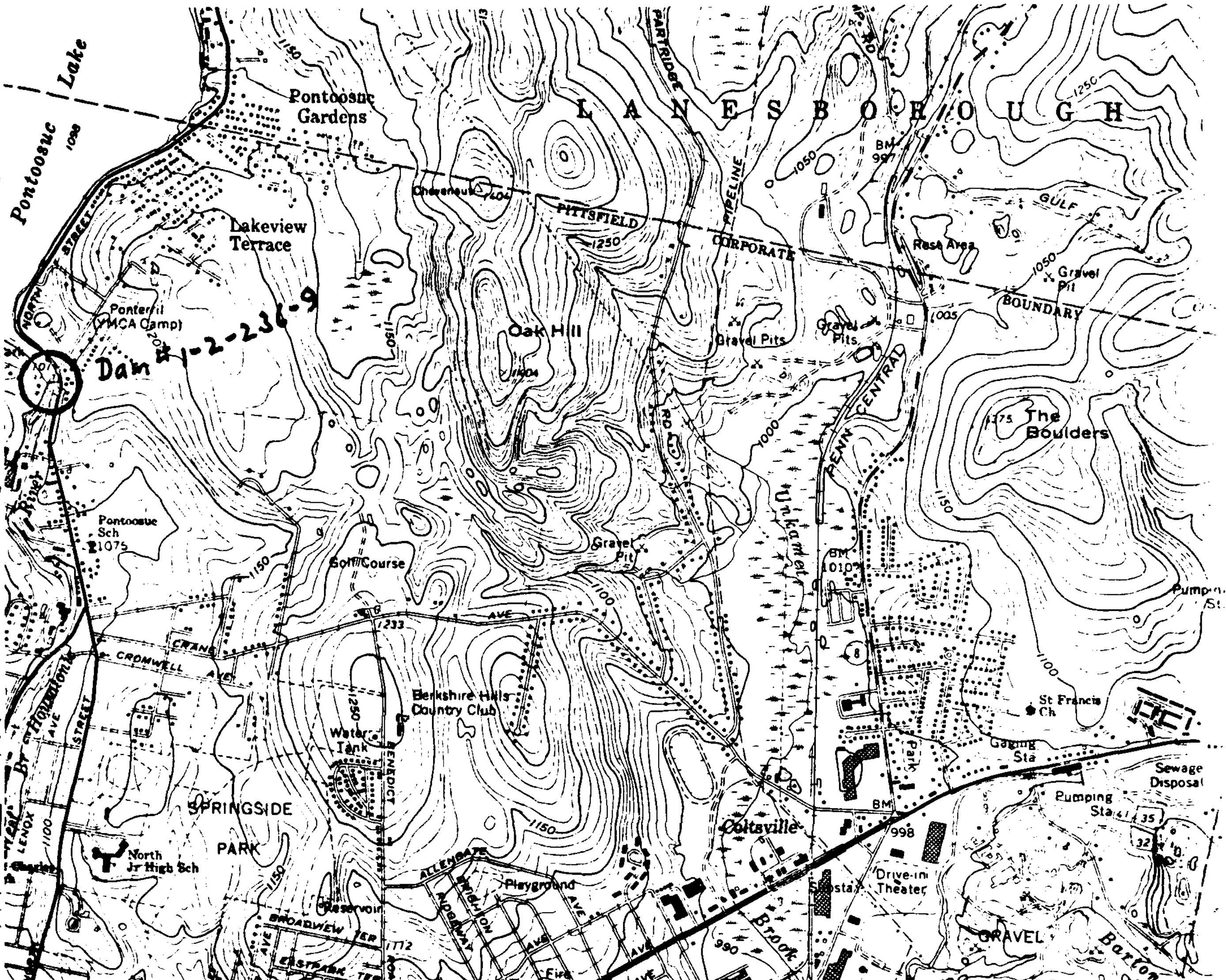
This stone masonry structure is well maintained and in good shape.

There are no deficiencies to report.

For location see Topo Sheet 5-A.

Overall Condition:

1. Safe X .
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____.
4. Unsafe _____.
5. Reservoir impoundment no longer exists [explain]


Pontoosuc Lake
Pontoosuc Gardens
L A N E S B O R O U G H
Lakeview Terrace
Ponterril (YMCA Camp)
Dam #1-2-236-9
Oak Hill
PITTSFIELD CORPORATE BOUNDARY
Gravel Pits
PENN CENTRAL
The Boulders
Pontoosuc Sch
Golf Course
Unkamet Brook
CROMWELL AVE
Berkshire Hills Country Club
Water Tank
St Francis Ch
Gaging Sta
Sewage Disposal
Pumping Sta
SPRINGSIDE PARK
North Jr High Sch
Coltsville
Playground
Reservoir
Drive-in Theater
GRAVEL PITS
Barton Brook
Fire Sta
Crane Sch
St Marys Sch
Allendale Sch
Adams Junction
Radio Tower
PITTSFIELD
County Jail
Rice Sch
Substation
Yankee Orchards
Silver Lake
Housatonic River
PIPELINE
Playground
Lakewood
Radio Tower
St Lukes Hospital
Hubbard Sch
Goodrich Pond
BRATTLE BROOK PARK
Brattle Brook
High Sch
Deming Park
Dawes Sch
Fire Sta
Substation
Gravel Pit
HUBBARD AVE
CORPORATE BOUNDARY ROAD

COUNTY OF BERKSHIRE, MASS.

INSPECTION OF DAMS

City or Town of Pittsfield Date October 31,1968

Name of Dam Pontoosuc Inspector William A. Heaphy

Owner County of Berkshire Address Court House,Pittsfield,Mass. Tel.

Caretaker County of Berkshire Engineering Department Address Court House, Pittsfield,Mass. Tel.

Location South end of Pontoosuc Lake, Head water of west branch of Housatonic River

Type and Dimensions Stone masonry, arched upstream, 19' high-56' of wall on east end 20' on west end.

Spillway, type and size 81' long; 5'-8" wide, 4'-2" freeboard.

Outlets, type and size 6'X6' gate in gate house diverts water to mill.

Flashboards, type and height None

Date Built 1865 Condition Good

When last repaired 1962 By whose orders Owners

Nature of Repairs Downstream face completely cleaned and repointed.

Purpose of Dam Formerly manufacturing- now recreation.

Approximate storage of water Approximately 500 Acres of water surface of lake.

Approximate area of water shed About 23 square miles

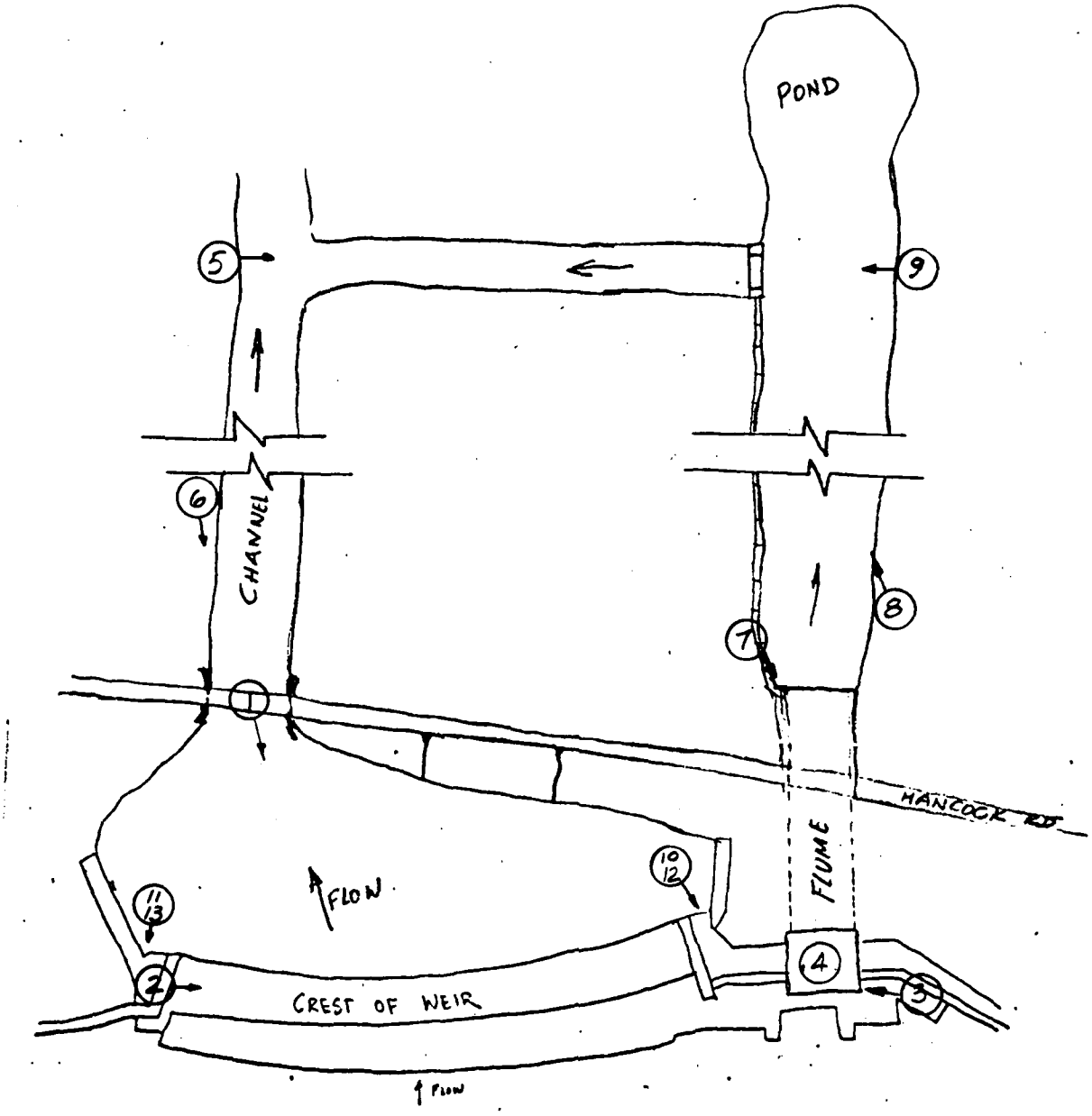
Possible damage due to failure of dam Could be extensive in the downstream area through out city and along river southerly.

Remarks Water 13¼" below spillway level . Slight seepage in lower east abutment. Leak in area of outlet pipe easterly of gate house. Brush and growth around both east and west abutments. Gate open 8".

Recommendations Brush and growth should be removed. Leak in area of outlet pipe should be checked.

PHOTOGRAPHS

APPENDIX C



TAMS BROOKLINE MASS	US.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM. MASS.

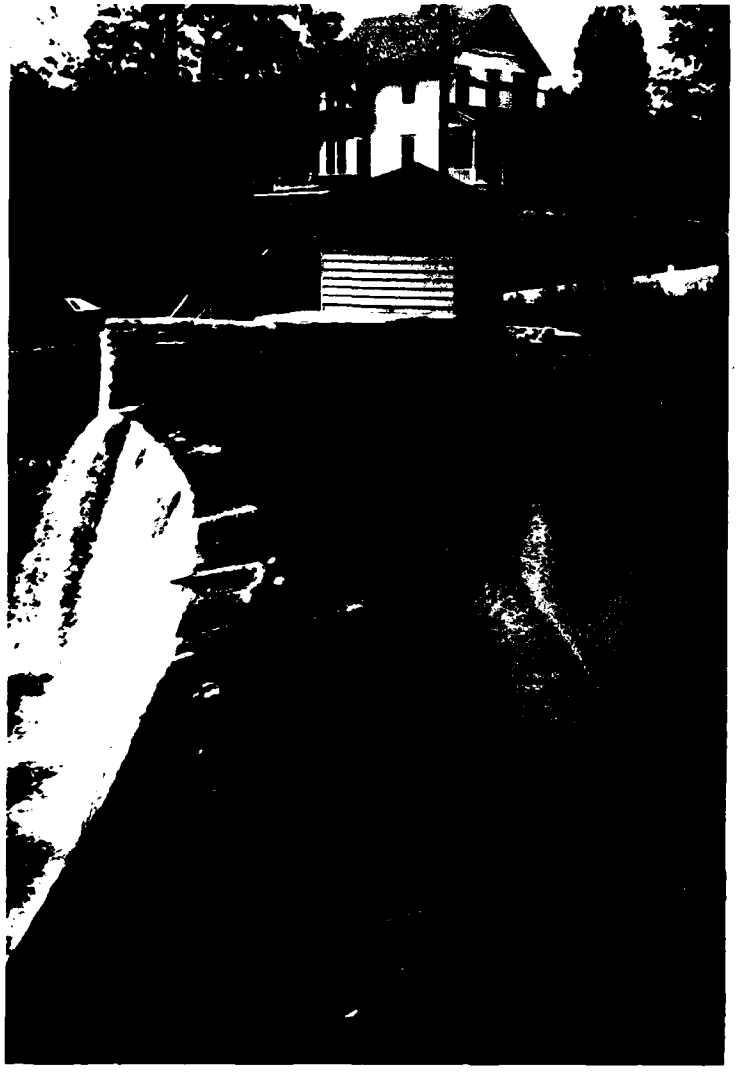
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

PONTOOSUC LAKE DAM

PHOTOGRAPH LOCATION GUIDE

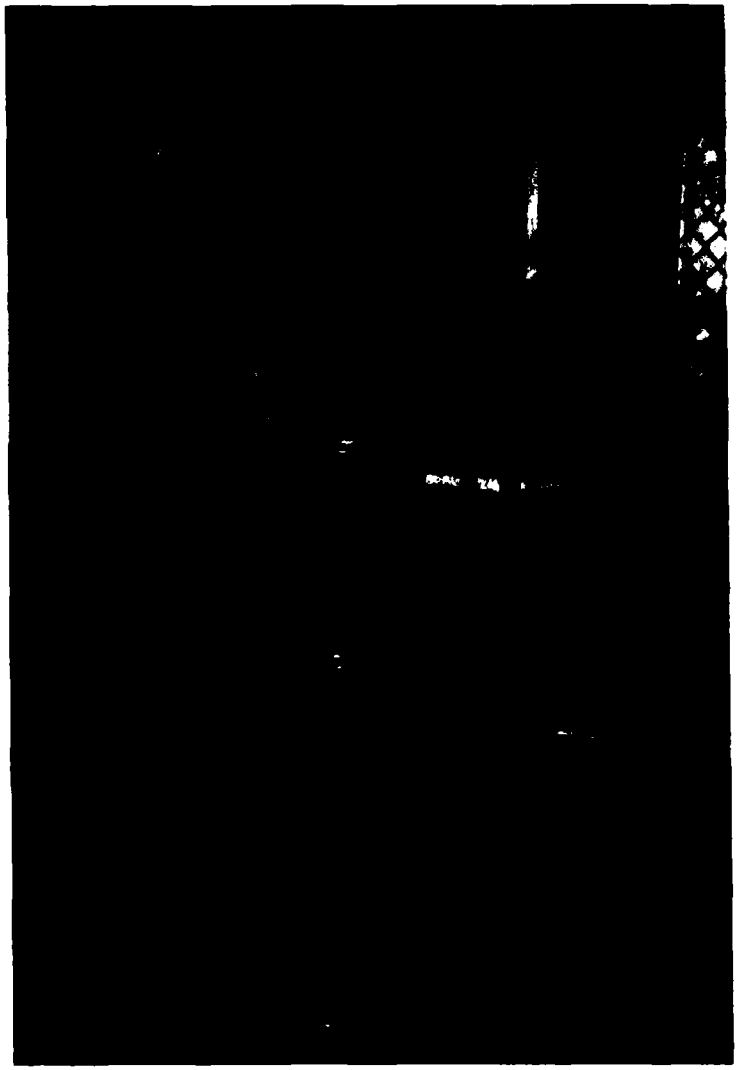
HOUSATONIC RIVER MASS

SCALE	NTS
DATE	JULY 78



(2) VIEW OF SPILLWAY CREST AND GATE HOUSE

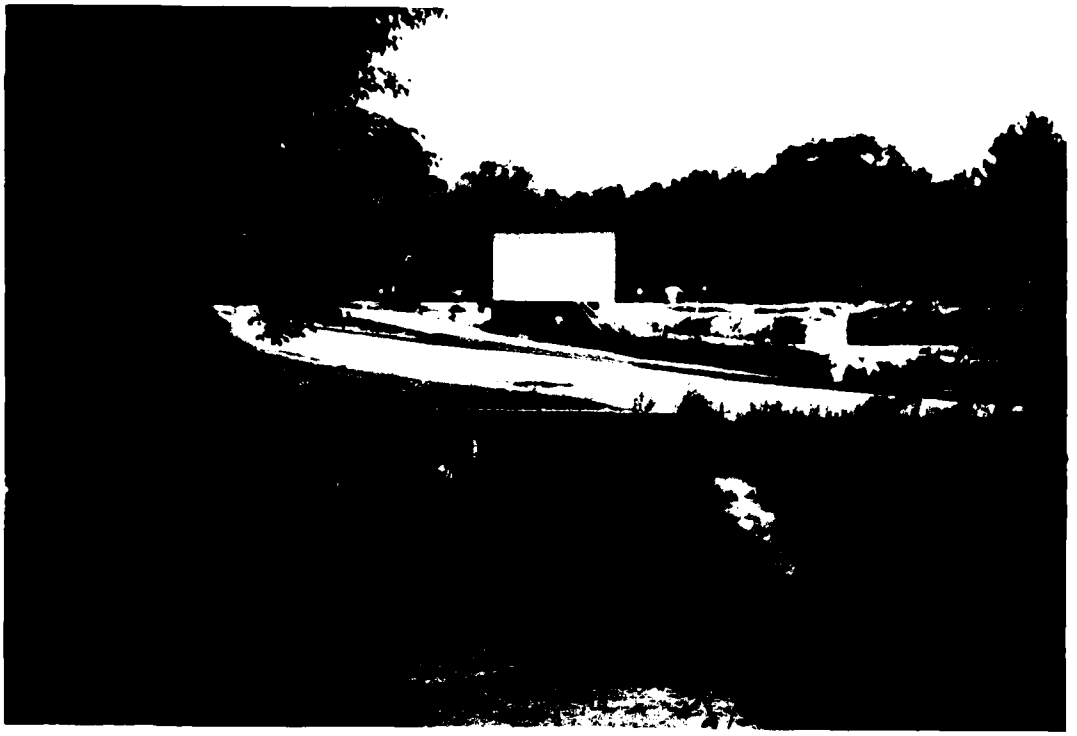
(3) GATE HOUSE AND TRASH RACK
NOTE MINOR DEBRIS



④ SLUICE GATE OPERATING STAND

⑤ CONFLUENCE OF MAIN CHANNEL (HOUSATONIC RIVER) AND FLUME CHANNEL

(6) DOWNSTREAM CHANNEL WITH VIEW OF HANCOCK ROAD BRIDGE AND CHANNEL SLOPE PROTECTION (LOOKING UPSTREAM)



(7) VIEW OF STEEL PIPE FLUME OUTLET AND GATE HOUSE

(8) FLUME CHANNEL SHOWING WOODEN LAGGED RETAINING WALL, OVERHANGING TREES AND DEBRIS (LOOKING DOWNSTREAM)

(9) DEMOLISHED SPILLWAY AT DOWNSTREAM END OF FLUME CHANNEL

(10) VIEW OF GUNITED WEST HEAD AND WING WALLS
NOTE EROSION AT THE BOTTOM OF WALL AND SEEPAGE

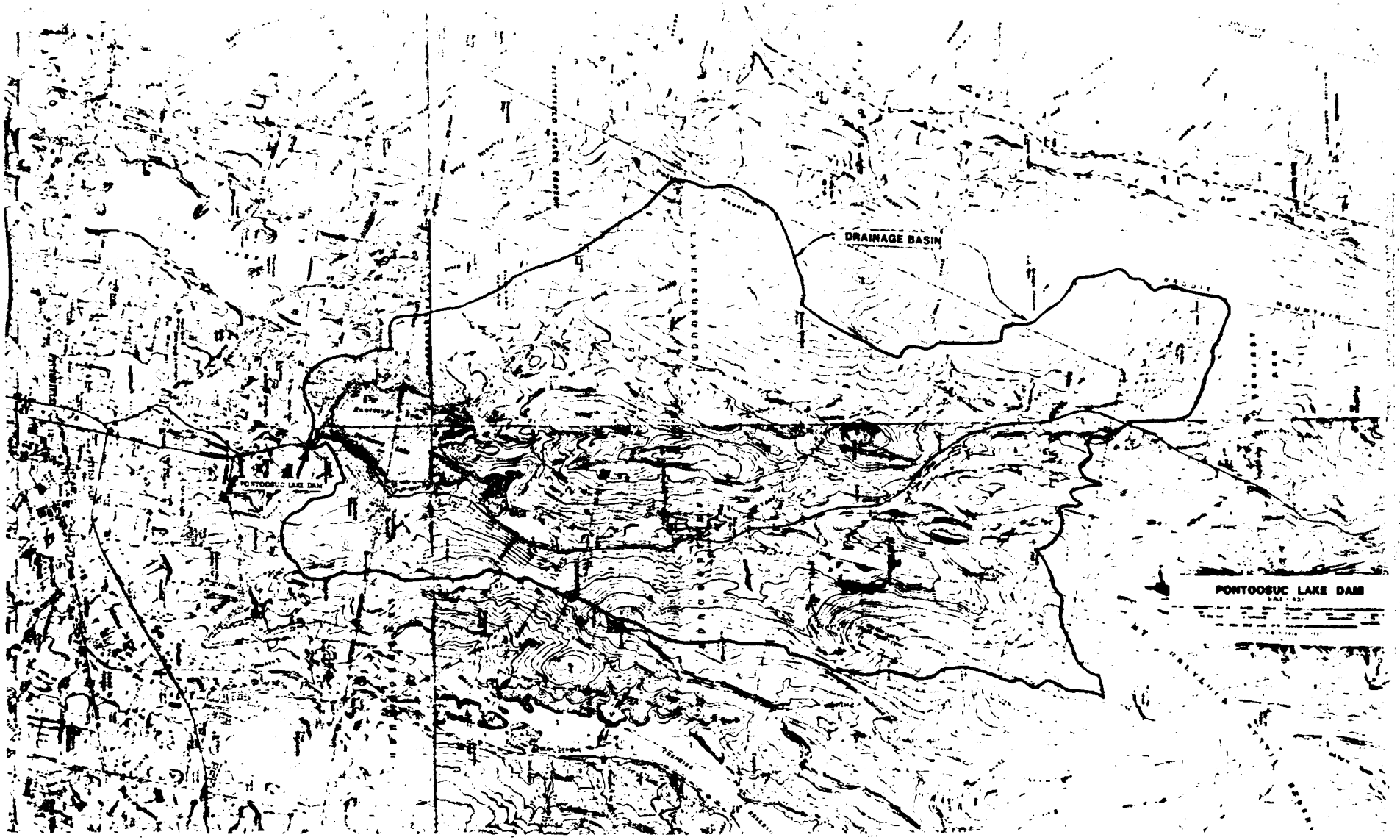
(11) VIEW OF GUNITED EAST HEAD AND WING WALLS
NOTE EROSION AND SEEPAGE

(12) CLOSE UP VIEW SHOWING EROSION AND SEEPAGE
AT BOTTOM OF WEST HEAD AND WING WALLS
NOTE ROTTED TIMBER TO RIGHT OF TAPE

(13) CLOSE UP VIEW SHOWING EROSION AND SEEPAGE
AT BOTTOM OF EAST HEAD AND WING WALLS

HYDROLOGIC DATA & COMPUTATIONS

APPENDIX D


DRAINAGE BASIN
POINTOOSUC LAKE DAM
POINTOOSUC LAKE DAM

TAMS

Job No. 1491-02 Sheet 1 of

Project PONTOOSUC LAKE DAM Date 9/20/79

Subject By (WJ)

640 ACRES = 1 MI² Ch'k. by

LAKE AREA (1098 CONTOUR) = 527 ACRES

1100' CONTOUR AREA = 659 ACRES $\frac{0.99}{0.193480\ MI^2} = \frac{X}{1\ MI^2}$

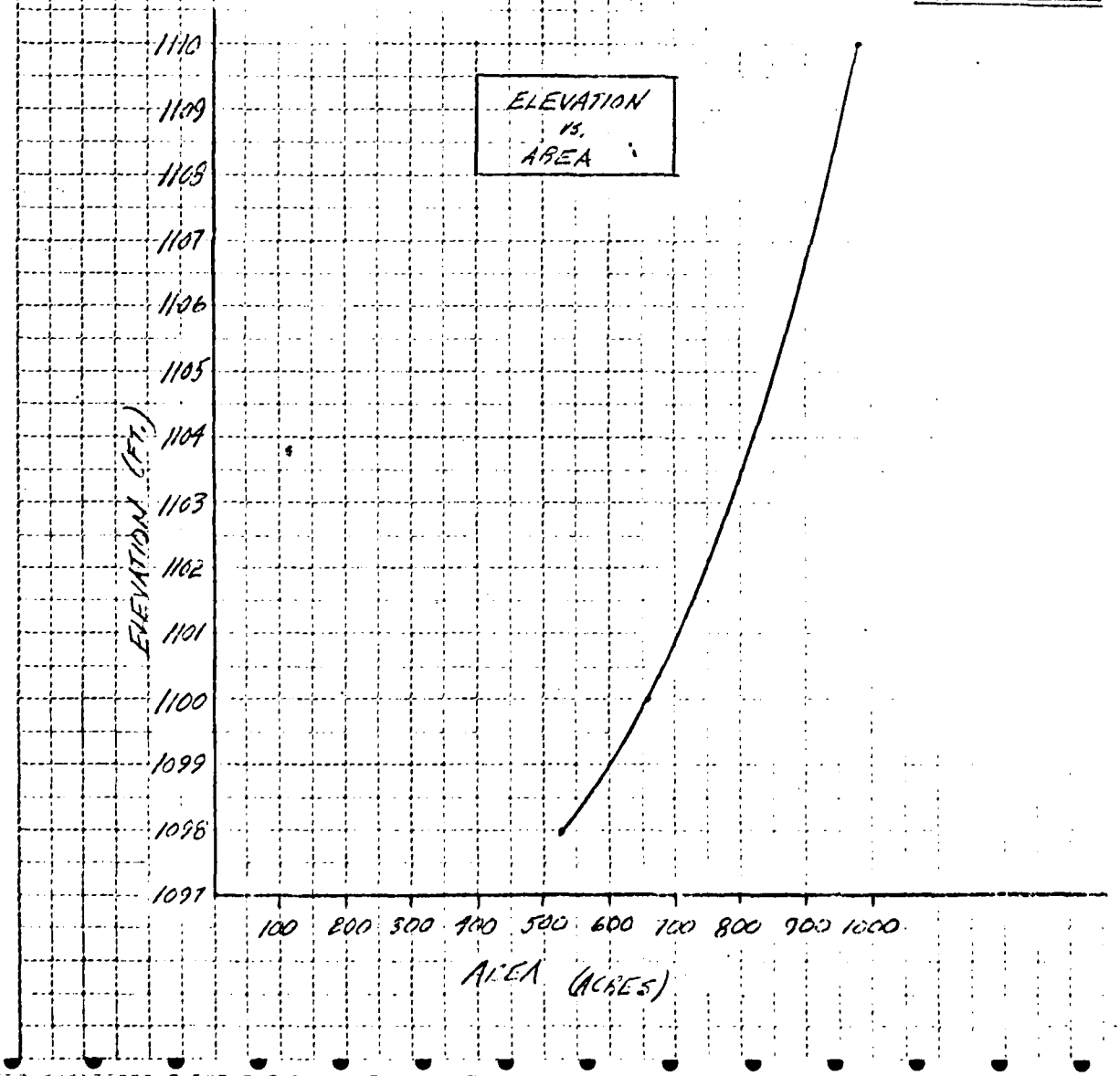
1110' CONTOUR AREA

15.03 6.16 7.515 + 3.09 = 10.595

7.50 / 7.53 3.07 / 3.07 10.595 ≡ 1.536 MI²

= 982.74 AC.

ELEVATION vs. AREA



IAMS

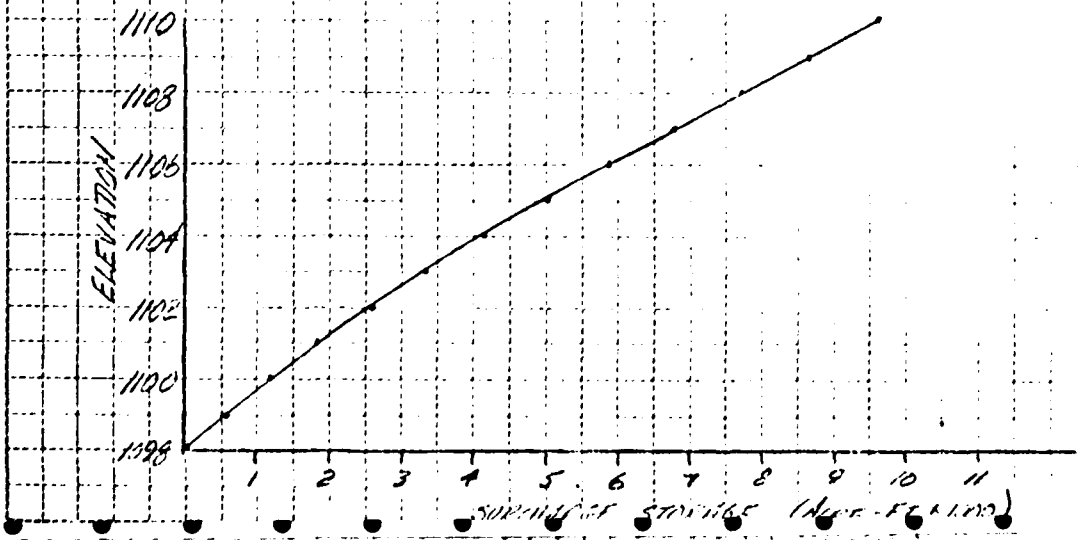
Job No. 1491-02 Sheet 2 of _____

Project PONTOOSUC LAKE DAM Date 2/20/75

Subject STORAGE CALCULATIONS By [illegible]

Ch'k. by _____

ELEVATION (FT.)	AREA (ACRE)	AVG AREA (ACRE)	VOL. (AC-FT.)	Σ VOL. (AC-FT.)
1098	527	–	–	–
		563.5		
1099	600		563.5	563.5
		629.5		
1100	659		629.5	1193.0
		683.5		
1101	708		683.5	1876.5
		729.0		
1102	750		729.0	2605.5
		767.5		
1103	785		767.5	3373.0
		802.5		
1104	820		802.5	4175.5
		835.5		
1105	851		835.5	5011.0
		867.0		
1106	883		867.0	5878.0
		896.5		
1107	910		896.5	6774.5
		921.0		
1108	932		921.0	7695.5
		944.5		
1109	957		944.5	8640.0
		970.0		
1110	983		970.0	9610.0



TAMS

Job No. 1497-02 Sheet 3 of _____

Project PONTOOSUC LAKE DAM Date 9/20/78

Subject UNIT HYDROGRAPH COMPUTATIONS By WP

DURATION, D = 0.25 HRS. Ch'k. by _____

SECOND BROOK DRAINAGE BASIN

$A = 7.44 \text{ MI}^2$

$L = 4.47 \text{ MI}$

$H = 1330'$

$D = 0.25 \text{ HRS.} = \underline{15 \text{ MIN.}}$

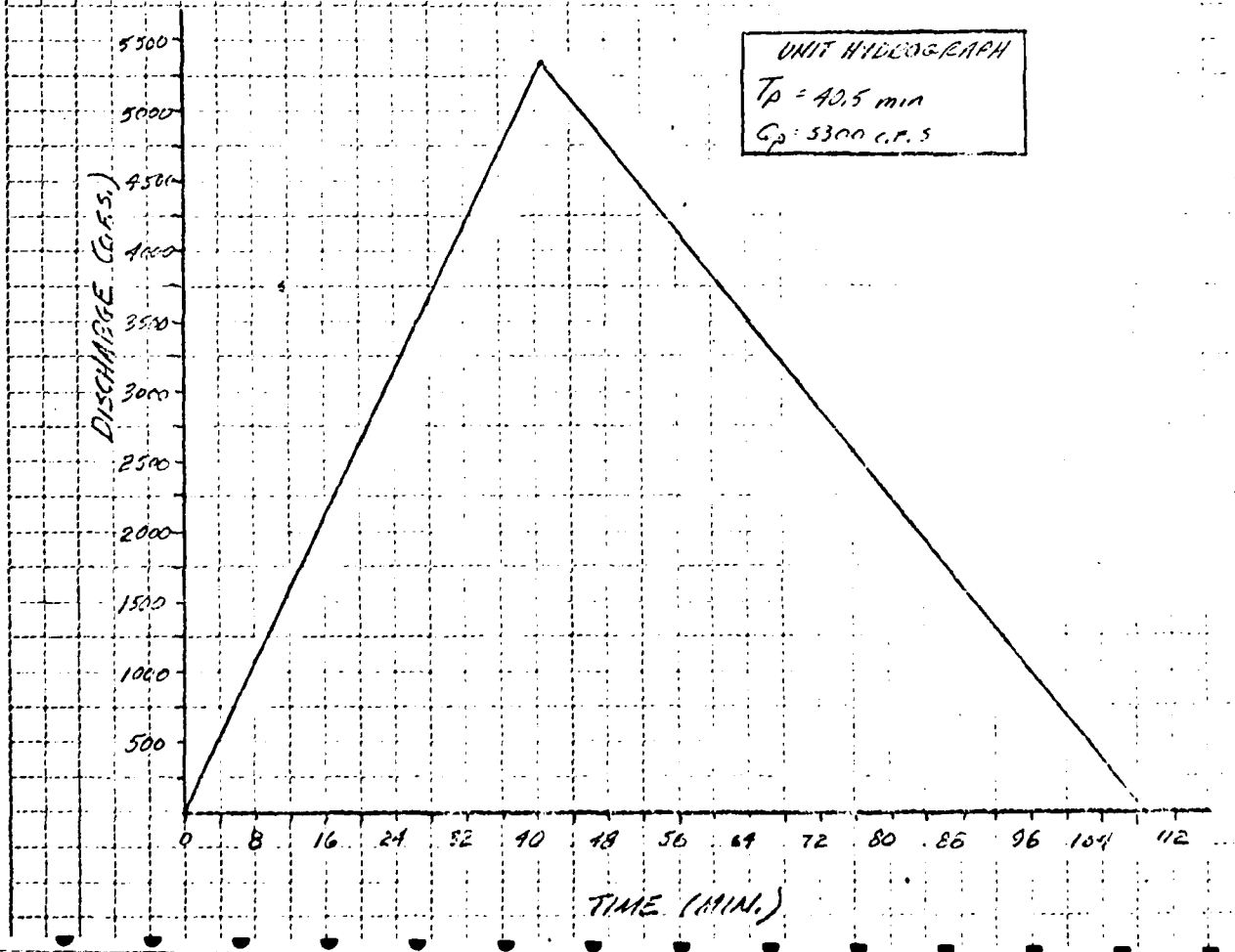
$T_c = \left(\frac{11.9L^3}{H}\right)^{0.385} = \left(\frac{11.9(4.47)^3}{1330}\right)^{0.385} = \underline{0.92 \text{ HRS}}$

$T_p = D/2 + 0.6T_c$

$T_p = 0.25/2 + 0.6(0.92) = 0.68 \text{ HR} = \underline{40.5 \text{ MIN.}}$

$Q_p = \frac{484A}{T_p} = \frac{484(7.44)}{0.68} = 5296 \text{ SAY } \underline{5300 \text{ C.F.S.}}$

$T_b = 2.67T_p = 1.82 \text{ HR} = \underline{109 \text{ MIN.}}$



TAMS

Job No. 1427-02 Sheet 4 of

Project POMPERAUG LAKE DAM Date 9/20/79

Subject UNIT HYDROGRAPH COMPUTATIONS By

DURATION, D = 0.25 HRS Ch'k. by

TOWNE BROOK DRAINAGE BASIN

$A = 14.50\ MI^2$

$L = 7.61\ MI$

$H = 1502'$

$D = 0.25\ HRS = 15\ MIN.$

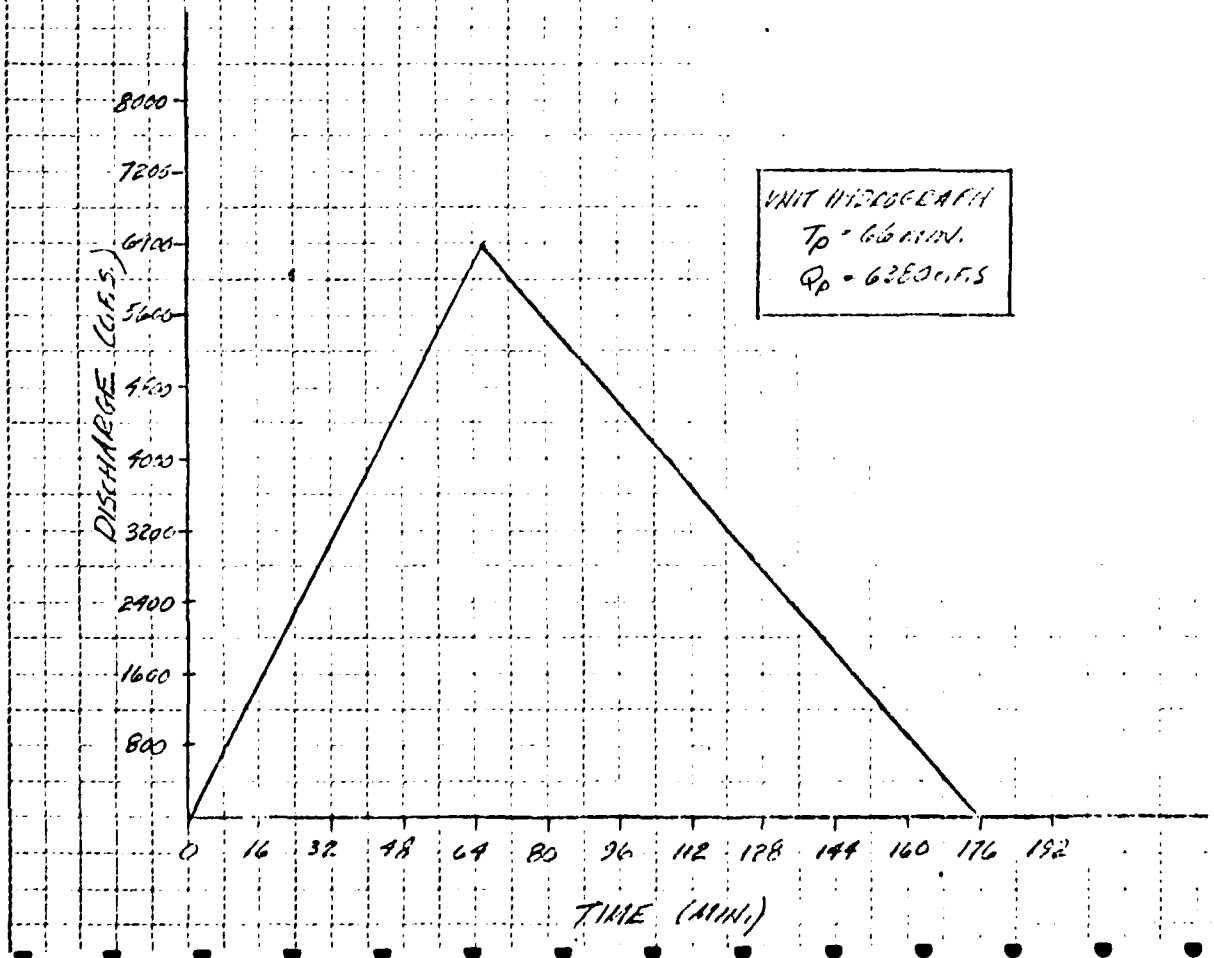
$T_c = \left(\frac{11.9L^3}{H}\right)^{0.385} = \left[\frac{11.9(7.61)^3}{1502}\right]^{0.385} = 1.62\ HR$

$T_p = D/2 + 0.6T_c$

$T_p = 1.10\ HR. = 66\ MIN.$

$Q_p = \frac{484A}{T_p} = \frac{484(14.50)}{1.10} = 6380\ C.F.S.$

$T_b = 2.67\ T_p = 2.94\ HR = 176\ MIN.$



TAMS

Job No. 1497-02 Sheet 5 of _____

Project PONTOOSUC LAKE DAM Date 9/20/18

Subject _____ By (WP)

Ch'k. by _____

JOWIE BROOK

CN = 80

$S = \frac{100}{CN} - 10 = 2.5$

$Q = \frac{(P-0.25)^2}{P+0.85} = \frac{(P-0.5)^2}{P+2.0}$

SECUM BROOK

CN = 85

$S = \frac{100}{CN} - 10 = 1.76$

$Q = \frac{(P-0.25)^2}{P+0.85} = \frac{(P-0.35)^2}{P+1.41}$

TAMS

Job No. 1497-02 Sheet 6 of _____

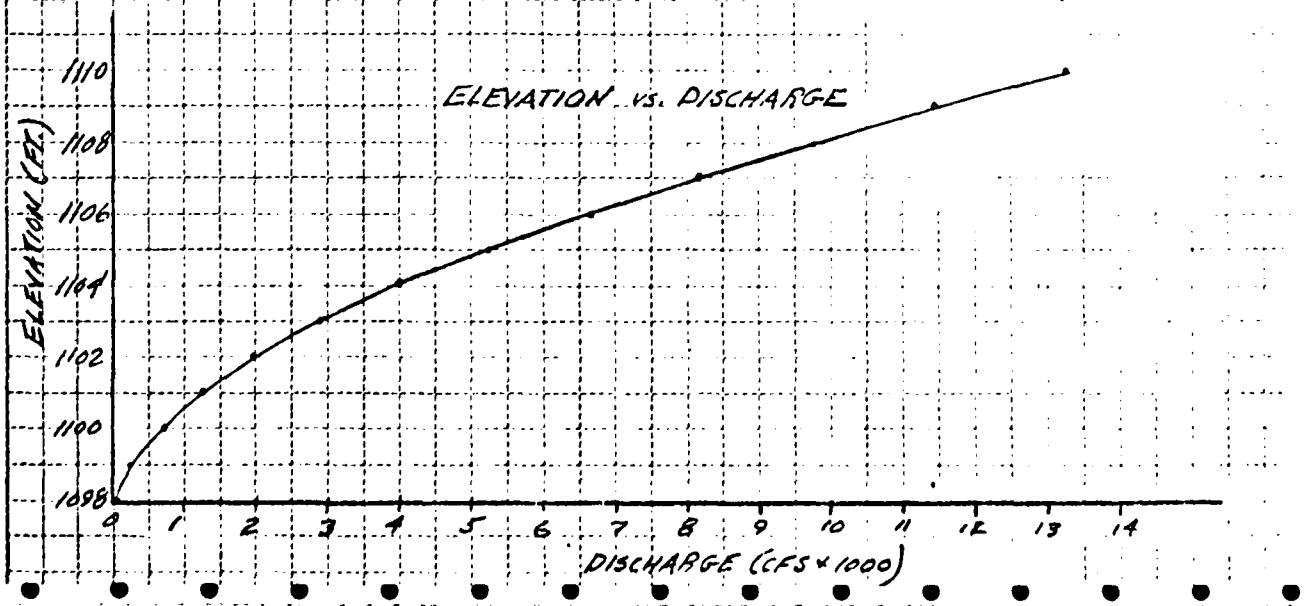
Project PONTOOSUC LAKE DAM Date 9/20/78

Subject DISCHARGE RATING CURVE By WJG

Ch'k. by _____

ASSUME: CRITICAL DEPTH OVER WEIR + DAM, C = 3.0875
ALSO VERTICAL WALLS SEPARATE WEIR FLOW FROM DAM FLOW $Q = CLH^{3/2}$ $L_{WEIR} = 80'$ $L_{DAM} = 43'$

ELEVATION	HEAD$_{WEIR}$ (FT.)	HEAD$_{DAM}$ (FT.)	Q_{WEIR} (CFS)	Q_{DAM} (CFS)	Q_{TOTAL} (CFS)
1098	0	0	0	0	0
1099	1	0	247.0	0	247.0
1100	2	0	698.6	0	698.6
1101	3	0	1283.5	0	1283.5
1102	4	0	1976.0	0	1976.0
1103	5	1	2761.5	132.8	2894.3
1104	6	2	3630.1	375.5	4005.6
1105	7	3	4571.5	689.9	5261.4
1106	8	4	5589.0	1062.1	6651.1
1107	9	5	6669.0	1484.3	8153.3
1108	10	6	7810.8	1951.2	9762.0
1109	11	7	9011.3	2458.8	11470.1
1110	12	8	10267.6	3004.1	13271.7



Sheet 4 of 7

PMF

PONTOOSUC LAKE DAM
JOB 1497-02
DAM INSPECTION
FLOOD ROUTING

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
1098.00	0.04	0.00	8.25	1	NO	YES	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
1098.00	0.0000	0.00
1099.00	563.5001	247.00
1100.00	1193.0002	698.60
1101.00	1876.5002	1283.50
1102.30	2605.5004	1976.00
1103.00	3373.0004	2894.30
1104.00	4175.0009	4005.60
1105.00	5011.0009	5264.40
1106.00	5879.0009	6651.10
1107.00	6775.0009	9153.30
1108.20	7696.0009	9762.00
1109.00	8640.0019	11470.00
1110.00	9610.0019	13272.00

Sheet 4 of 8

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	1098.00
0.04	1369.95	1.04	2.3757	1098.00
0.08	2739.90	4.16	9.4995	1098.01
0.13	4109.85	9.36	21.3640	1098.03
0.17	5479.80	16.64	37.9621	1098.06
0.21	6849.75	25.98	59.2865	1098.10
0.25	8207.82	37.39	85.3095	1098.15
0.29	9328.11	50.66	115.5909	1098.20
0.34	10448.41	65.67	149.7119	1098.26
0.38	11568.70	82.26	187.6668	1098.33
0.42	12689.00	100.57	229.4495	1098.40
0.46	13809.29	120.56	275.0545	1098.48
0.50	14997.46	142.27	324.5934	1098.57
0.55	16830.44	166.25	379.2963	1098.67
0.59	18663.42	192.98	440.2737	1098.78
0.63	20496.40	222.46	507.5159	1098.90
0.67	22329.38	259.56	581.0106	1099.02
0.71	24162.35	316.72	660.6984	1099.15
0.76	26006.86	378.32	746.5625	1099.29
0.80	27920.52	444.44	838.7272	1099.43
0.84	29834.19	515.16	937.2971	1099.59
0.88	31747.84	590.45	1042.2561	1099.76
0.92	33661.50	670.32	1153.5981	1099.93
0.97	35575.17	765.57	1271.2648	1100.11
1.01	37488.09	871.56	1395.1230	1100.29
1.05	39622.82	982.35	1524.5896	1100.48
1.09	41617.54	1097.54	1659.1972	1100.68
1.13	42212.28	1217.12	1798.9340	1100.88
1.18	43807.00	1347.41	1943.7797	1101.09
1.22	45401.73	1489.80	2093.6806	1101.29
1.26	46961.63	1636.76	2248.3803	1101.51
1.30	47889.97	1787.32	2406.8823	1101.72
1.34	48818.31	1940.78	2568.4257	1101.94
1.39	49946.64	2128.49	2732.9570	1102.16
1.43	50874.98	2328.81	2900.3740	1102.38
1.47	52003.32	2532.55	3070.6591	1102.60
1.51	52951.10	2739.40	3243.5395	1102.83
1.55	53392.39	2956.77	3418.0969	1103.05
1.60	53883.64	3199.92	3593.5654	1103.27
1.64	54384.92	3444.31	3769.9375	1103.49
1.68	54886.19	3689.94	3947.1992	1103.71
1.72	55387.46	3936.79	4125.3466	1103.93
1.76	55745.02	4199.99	4304.1054	1104.15
1.81	55815.03	4468.87	4482.6757	1104.36
1.85	55885.03	4736.72	4660.5576	1104.58
1.89	55955.03	5003.53	4837.7548	1104.79
1.93	56025.04	5269.62	5014.2705	1105.00
1.97	56095.05	5550.82	5190.0791	1105.20
2.02	56114.29	5830.70	5365.0683	1105.40

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
2.06	56050.99	6108.91	5539.0127	1105.60
2.10	55937.68	6285.23	5711.7744	1105.80
2.14	55824.38	6660.07	5883.3603	1106.00
2.19	55861.07	6945.43	6053.7539	1106.19
2.23	55797.77	7228.76	6222.9414	1106.38
2.27	55665.35	7509.89	6390.8095	1106.57
2.31	55440.71	7788.36	6557.0969	1106.75
2.35	55216.07	8063.90	6721.6230	1106.94
2.39	54991.44	8344.41	6884.4179	1107.11
2.44	54766.80	8625.69	7045.4541	1107.29
2.48	54542.17	8903.91	7204.7392	1107.46
2.52	54226.56	9178.82	7362.1269	1107.63
2.56	53810.87	9449.86	7517.2978	1107.80
2.60	53395.17	9716.74	7670.0927	1107.97
2.65	52979.46	9987.28	7820.5135	1108.13
2.69	52563.75	10255.14	7968.5556	1108.28
2.73	52144.05	10518.71	8114.2324	1108.44
2.77	51640.99	10777.75	8257.4004	1108.59
2.81	51050.81	11031.73	8397.7734	1108.74
2.86	50460.63	11280.42	8535.2246	1108.88
2.90	49870.45	11525.30	8669.7734	1109.03
2.94	49280.27	11769.87	8801.4219	1109.16
2.98	48690.10	12009.07	8930.1816	1109.29
3.02	48052.58	12242.79	9055.9902	1109.42
3.07	47379.53	12470.79	9178.7226	1109.55
3.11	46706.50	12693.01	9298.3379	1109.67
3.15	46033.45	12909.47	9414.8554	1109.79
3.19	45360.40	13120.21	9528.2968	1109.91
3.23	44687.36	13325.27	9638.6797	1110.02
3.28	44012.92	13524.68	9746.0215	1110.14
3.32	43337.62	13718.48	9850.3379	1110.24
3.36	42662.32	13906.68	9951.6484	1110.35
3.40	41987.03	14089.34	10049.9707	1110.45
3.44	41311.73	14266.48	10145.3242	1110.55
3.49	40636.43	14438.14	10237.7285	1110.64
3.53	40001.09	14604.49	10327.2715	1110.73
3.57	39385.75	14765.75	10414.0761	1110.82
3.61	38770.40	14922.02	10498.1933	1110.91
3.65	38155.06	15073.33	10579.6406	1110.99
3.70	37539.72	15219.70	10658.4355	1111.08
3.74	36924.38	15361.19	10734.5957	1111.15
3.78	36360.13	15497.97	10808.2246	1111.23
3.82	35816.34	15630.32	10879.4648	1111.30
3.86	35272.56	15758.32	10948.3652	1111.37
3.91	34728.78	15882.00	11014.9414	1111.44
3.95	34185.00	16001.38	11079.2070	1111.51
3.99	33641.21	16116.51	11141.1797	1111.57
4.03	33169.49	16227.63	11200.9941	1111.64
4.07	32718.01	16335.07	11258.8281	1111.69
4.12	32267.53	16438.92	11314.7304	1111.75

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
4.16	31817.05	16539.21	11368.7148	1111.81
4.20	31366.57	16635.96	11420.7949	1111.84
4.24	30916.10	16729.19	11470.9804	1111.91
4.28	30380.64	16818.66	11519.1386	1111.96
4.33	29825.14	16904.04	11565.0996	1112.01
4.37	29269.64	16985.31	11608.8437	1112.06
4.41	28714.14	17062.48	11650.3847	1112.10
4.45	28158.64	17135.58	11689.7363	1112.14
4.49	27603.14	17204.65	11726.9140	1112.18
4.54	27082.34	17269.82	11761.9902	1112.21
4.58	26567.35	17331.23	11795.0488	1112.25
4.62	26052.35	17388.94	11826.1133	1112.28
4.66	25537.35	17442.96	11855.1953	1112.31
4.70	25022.36	17493.33	11882.3086	1112.34
4.75	24507.36	17540.07	11907.4668	1112.36
4.79	24127.30	17583.63	11930.9140	1112.39
4.83	23761.51	17624.51	11952.9199	1112.41
4.87	23395.72	17662.78	11973.5195	1112.43
4.91	23029.93	17698.45	11992.7207	1112.45
4.96	22664.14	17731.54	12010.5332	1112.47
5.00	22298.35	17762.07	12026.9648	1112.49
5.04	22019.43	17790.32	12042.1758	1112.50
5.08	21744.90	17816.62	12056.3320	1112.52
5.12	21470.37	17840.99	12069.4472	1112.53
5.17	21195.83	17863.43	12081.5293	1112.54
5.21	20921.30	17883.97	12092.5840	1112.55
5.25	20646.77	17902.61	12102.6172	1112.56
5.29	20557.95	17919.80	12111.8711	1112.57
5.33	20369.19	17935.98	12120.5840	1112.58
5.38	20230.43	17951.18	12128.7617	1112.59
5.42	20091.67	17965.38	12136.4062	1112.60
5.46	19952.92	17978.60	12143.5215	1112.61
5.50	19818.66	17990.85	12150.1191	1112.61
5.54	19775.42	18002.46	12156.3672	1112.62
5.59	19732.19	18013.71	12162.4258	1112.63
5.63	19688.95	18024.62	12168.2949	1112.63
5.67	19645.71	18035.18	12173.9785	1112.64
5.71	19602.48	18045.39	12179.4746	1112.64
5.75	19534.44	18055.18	12184.7441	1112.65
5.80	19220.24	18063.71	12189.3340	1112.65
5.84	19024.14	18070.21	12192.8379	1112.66
5.88	18818.98	18074.72	12195.2636	1112.66
5.92	18313.83	18077.23	12196.6172	1112.66
5.96	18068.68	18077.77	12196.9062	1112.66
6.01	17691.20	18076.30	12196.1172	1112.66
6.05	17299.39	18072.57	12194.1054	1112.66
6.09	16907.57	18066.34	12190.7519	1112.66
6.13	16515.76	18057.63	12186.0644	1112.65
6.17	16123.95	18046.46	12180.0508	1112.64
6.22	15732.14	18032.84	12172.7207	1112.64

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
6.26	15310.81	18016.70	12164.0312	1112.63
6.30	14763.59	17997.55	12153.7207	1112.62
6.34	14216.37	17975.00	12141.5840	1112.61
6.38	13669.16	17949.98	12127.6328	1112.59
6.43	13121.94	17919.81	12111.6769	1112.57
6.47	12574.72	17887.21	12094.3301	1112.56
6.51	12027.37	17851.31	12075.0019	1112.54
6.55	11479.60	17812.11	12053.9023	1112.51
6.59	10931.84	17769.64	12031.0429	1112.49
6.64	10384.07	17723.93	12006.4355	1112.47
6.68	9836.31	17674.99	11980.0918	1112.44
6.72	9288.54	17622.84	11952.0215	1112.41
6.76	8765.31	17567.59	11922.2793	1112.38
6.80	8303.60	17509.53	11891.0254	1112.35
6.85	7841.88	17448.67	11858.3750	1112.31
6.89	7380.17	17385.64	11824.3359	1112.28
6.93	6918.45	17319.84	11788.9179	1112.24
6.97	6456.74	17251.50	11752.1308	1112.20
7.01	6035.04	17180.75	11714.0508	1112.16
7.06	5693.61	17108.02	11674.8965	1112.12
7.10	5352.18	17033.55	11634.8125	1112.08
7.14	5010.76	16957.37	11593.8047	1112.04
7.18	4669.33	16879.48	11551.8789	1112.00
7.22	4327.90	16799.90	11509.0410	1111.95
7.27	4022.24	16718.75	11465.3593	1111.91
7.31	3775.02	16636.35	11421.0019	1111.86
7.35	3528.11	16552.89	11376.0761	1111.82
7.39	3281.20	16468.38	11330.5840	1111.77
7.43	3034.28	16382.82	11284.5293	1111.72
7.48	2786.77	16296.22	11237.9140	1111.67
7.52	2563.05	16208.67	11190.7851	1111.62
7.56	2370.61	16120.34	11143.2383	1111.58
7.60	2178.17	16031.34	11095.3320	1111.53
7.64	1985.74	15941.68	11047.0683	1111.48
7.68	1793.30	15851.36	10998.4492	1111.43
7.72	1600.86	15760.38	10949.4765	1111.38
7.77	1434.94	15668.83	10900.1972	1111.33
7.81	1298.29	15576.91	10850.7129	1111.27
7.85	1161.63	15484.68	10801.0722	1111.22
7.90	1024.97	15392.18	10751.2793	1111.17
7.94	888.31	15299.40	10701.3320	1111.12
7.98	751.65	15206.33	10651.2344	1111.07
8.02	643.32	15113.07	10601.0351	1111.02
8.06	560.80	15019.80	10550.8281	1110.96
8.11	478.29	14926.60	10500.6582	1110.91
8.15	395.78	14833.46	10450.5254	1110.86
8.19	313.26	14740.40	10400.4277	1110.81
8.23	230.75	14647.40	10350.3672	1110.76
MAX. VALUES	54114.29	18077.77		1112.66
MIN. VALVES	0.00	0.00		1098.00

Sheet 1 of 2

½ PMF

PONTOOSUC LAKE DAM
JOB 1497-02
DAM INSPECTION
FLOOD ROUTING

FL

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
1095.00	0.04	0.00	8.25	1	NO	YES	1.000	1.000	0.500	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
1096.00	0.0000	0.00
1098.00	563.5001	247.00
1100.00	1193.0002	698.60
1101.00	1876.5002	1293.50
1102.00	2605.5004	1976.00
1103.00	3373.0004	2694.30
1104.00	4175.0009	4005.60
1105.00	5011.0009	5264.40
1106.00	5879.0009	6651.10
1107.00	6775.0009	8153.30
1108.00	7696.0009	9762.00
1109.00	8640.0019	11470.00
1110.00	9610.0019	13272.00

Sheet 1 of 13

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	1098.00
0.04	654.97	0.52	1.1878	1098.00
0.08	1360.95	2.08	4.7497	1098.00
0.13	2054.62	4.69	10.6820	1098.01
0.17	2729.90	8.32	18.9810	1098.03
0.21	3424.87	12.99	29.6432	1098.05
0.25	4103.91	18.69	42.6547	1098.07
0.29	4664.05	25.33	57.7954	1098.10
0.34	5224.20	32.81	74.8559	1098.13
0.38	5734.35	41.13	93.8334	1098.16
0.42	6344.50	50.28	114.7247	1098.20
0.46	6934.64	60.28	137.5272	1098.24
0.50	7494.78	71.13	162.2967	1098.28
0.55	8415.22	83.12	189.6481	1098.33
0.59	9231.71	96.49	220.1369	1098.39
0.63	10248.20	111.23	253.7579	1098.45
0.67	11164.69	127.33	290.5067	1098.51
0.71	12081.17	144.81	330.3784	1098.58
0.76	13003.43	163.66	373.3782	1098.66
0.80	13980.26	183.91	419.5714	1098.74
0.84	14917.09	205.58	469.0130	1098.83
0.88	15873.92	228.67	521.6982	1098.92
0.92	16831.75	253.18	577.6197	1099.02
0.97	17787.58	279.53	636.7348	1099.11
1.01	18714.04	344.18	698.9674	1099.21
1.05	19511.41	390.86	764.0332	1099.31
1.09	20308.77	439.40	831.7015	1099.42
1.13	21106.14	489.81	901.9658	1099.53
1.18	21903.50	542.07	974.8195	1099.65
1.22	22700.86	596.19	1050.2565	1099.77
1.26	23470.61	652.07	1128.1530	1099.89
1.30	23944.98	711.44	1208.0112	1100.02
1.34	24439.15	771.11	1289.4277	1100.14
1.39	24977.32	832.10	1372.3947	1100.26
1.43	25415.49	924.41	1456.8779	1100.39
1.47	26081.66	996.02	1542.9025	1100.51
1.51	26440.55	1072.83	1630.3237	1100.63
1.55	26681.19	1148.44	1718.6804	1100.76
1.60	26941.82	1224.57	1807.6428	1100.88
1.64	27182.46	1303.17	1897.2109	1101.02
1.68	27443.09	1388.80	1987.3605	1101.15
1.72	27693.73	1474.98	2078.0820	1101.27
1.76	27872.51	1561.59	2169.2490	1101.40
1.81	27907.51	1648.26	2260.4863	1101.52
1.85	27942.51	1734.75	2351.5444	1101.65
1.89	27977.51	1821.08	2442.4238	1101.77
1.93	28012.52	1907.24	2533.1254	1101.90
1.97	28047.52	1993.71	2623.6474	1102.02
2.02	28057.14	2105.69	2713.8969	1102.14

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
2.[illegible]	28395.49	2213.18	2803.7343	1102.25
2.[illegible]	27993.84	2329.09	2893.0898	1102.37
2.14	27662.19	2426.43	2971.9653	1102.49
2.1[illegible]	27373.53	2532.19	3070.3627	1102.60
2.[illegible]	27[illegible].[illegible]	2637.52	3158.2941	1102.72
2.[illegible]	27332.67	2741.95	3245.6718	1102.83
2.31	27720.35	2845.70	3332.3981	1102.94
2.[illegible]	27605.03	2947.13	3418.3501	1103.05
2.[illegible]	27495.72	3075.14	3503.5151	1103.14
2.44	27323.40	3192.05	3587.8823	1103.24
2.48	27271.08	3307.45	3671.4560	1103.37
2.[illegible]	27116.20	3422.45	3754.1611	1103.47
2.[illegible]	26905.43	3535.63	3835.8359	1103.57
2.[illegible]	26697.59	3647.24	3916.3994	1103.67
2.[illegible]	26499.73	3757.36	3995.8564	1103.77
2.[illegible]	26271.87	3865.94	4074.2124	1103.87
2.[illegible]	26074.02	3972.99	4151.4726	1103.[illegible]
2.77	25820.49	4084.73	4227.5556	1104.06
2.[illegible]	25525.40	4197.27	4302.2939	1104.15
2.[illegible]	25230.21	4307.69	4375.6211	1104.23
2.[illegible]	24935.22	4415.97	4447.5439	1104.32
2.[illegible]	24640.13	4522.17	4518.0703	1104.41
2.9[illegible]	24745.05	4626.27	4587.2090	1104.49
3.[illegible]	24026.29	4728.23	4654.9228	1104.57
3.07	23669.76	4827.95	4721.1504	1104.65
3.11	23353.25	4925.40	4785.8672	1104.73
3.15	23016.72	5020.59	4849.0820	1104.80
3.19	22680.20	5113.52	4910.8017	1104.88
3.[illegible]	22343.67	5204.22	4971.0351	1104.95
3.[illegible]	22006.46	5294.44	5029.7871	1105.02
3.3[illegible]	21669.81	5386.03	5087.0498	1105.08
3.[illegible]	21331.16	5475.24	5142.9271	1105.15
3.[illegible]	20993.51	5562.09	5197.1269	1105.21
3.44	20655.86	5646.59	5249.9570	1105.27
3.48	20318.21	5728.75	5301.3261	1105.33
3.53	20000.54	5808.64	5351.2763	1105.39
3.57	19692.87	5886.36	5399.8681	1105.44
3.61	19385.20	5961.94	5447.1259	1105.50
3.65	19077.53	6035.41	5493.0566	1105.55
3.70	18769.86	6106.76	5537.6679	1105.60
3.74	18462.19	6176.01	5580.9677	1105.65
3.78	18180.66	6243.25	5623.0068	1105.70
3.82	17908.17	6308.58	5663.9545	1105.75
3.86	17636.28	6372.05	5703.5351	1105.79
3.91	17364.39	6433.66	5742.0546	1105.84
3.95	17092.50	6493.42	5779.4199	1105.88
3.99	16820.60	6551.35	5815.6367	1105.92
4.03	16584.24	6607.55	5850.7734	1105.96
4.07	16359.00	6662.68	5884.9170	1106.00
4.12	16133.76	6718.23	5918.0859	1106.04

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
4.16	15908.52	6772.15	5950.2832	1106.08
4.20	15483.28	6824.45	5991.5136	1106.11
4.24	15458.05	6875.14	6011.7841	1106.14
4.28	15190.32	6924.11	6041.0254	1106.18
4.33	14912.57	6971.22	6069.1533	1106.21
4.37	14634.82	7016.44	6096.1572	1106.24
4.41	14357.07	7059.79	6122.0429	1106.27
4.45	14079.32	7101.28	6146.8173	1106.29
4.49	13801.57	7140.92	6170.4873	1106.32
4.54	13541.17	7178.77	6193.0598	1106.35
4.58	13304.67	7214.90	6214.6630	1106.37
4.62	13126.17	7249.33	6235.2207	1106.39
4.66	12948.67	7282.07	6254.7495	1106.42
4.70	12771.18	7313.12	6273.3115	1106.44
4.75	12633.68	7342.56	6290.9554	1106.46
4.79	12567.65	7370.41	6307.5234	1106.47
4.83	11580.75	7397.09	6323.4502	1106.49
4.87	11697.86	7422.54	6338.6513	1106.51
4.91	11514.96	7446.79	6353.1308	1106.52
4.96	11352.07	7469.84	6366.8935	1106.54
5.00	11169.17	7491.70	6379.9433	1106.55
5.04	11009.71	7512.49	6392.3603	1106.57
5.09	10872.45	7532.36	6404.2265	1106.58
5.13	10735.19	7551.32	6415.5488	1106.59
5.17	10597.91	7569.38	6426.3300	1106.61
5.21	10460.65	7586.53	6436.5742	1106.62
5.25	10323.38	7602.79	6446.2832	1106.63
5.29	10253.97	7618.36	6455.5781	1106.64
5.33	10184.59	7633.43	6464.5791	1106.65
5.37	10115.21	7648.02	6473.2880	1106.66
5.42	10045.83	7662.12	6481.7060	1106.67
5.46	9976.46	7675.73	6489.8359	1106.68
5.50	9909.73	7689.87	6497.6816	1106.69
5.54	9907.71	7701.65	6505.3291	1106.69
5.58	9906.09	7714.29	6512.8574	1106.70
5.63	9904.47	7726.69	6520.2666	1106.71
5.67	9902.85	7738.91	6527.5586	1106.72
5.71	9901.24	7750.92	6534.7334	1106.73
5.75	9797.32	7762.71	6541.7705	1106.73
5.79	9614.64	7773.69	6548.4433	1106.74
5.84	9466.07	7784.11	6554.5498	1106.75
5.88	9319.49	7793.39	6560.0927	1106.76
5.92	9156.91	7801.73	6565.0752	1106.76
5.96	9004.34	7809.15	6569.5009	1106.77
6.01	8845.80	7815.61	6573.3623	1106.77
6.05	8649.69	7821.01	6576.5879	1106.77
6.09	8453.79	7825.25	6579.1162	1106.78
6.13	8257.88	7828.32	6580.9521	1106.78
6.17	8061.97	7830.24	6582.0996	1106.78
6.22	7866.07	7831.02	6582.5625	1106.78

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
6.26	7655.40	7830.61	6582.3183	1106.78
6.30	7581.79	7828.80	6581.2382	1106.78
6.34	7105.18	7825.42	6579.2168	1106.78
6.39	6834.58	7820.47	6576.2607	1106.77
6.43	6550.97	7813.96	6572.3750	1106.77
6.47	6287.36	7805.90	6567.5644	1106.76
6.51	6013.68	7796.31	6561.8349	1106.76
6.55	5739.10	7785.19	6555.1904	1106.75
6.59	5465.92	7772.53	6547.6367	1106.74
6.64	5192.03	7758.37	6539.1787	1106.73
6.68	4918.15	7742.70	6529.8222	1106.72
6.72	4644.27	7725.53	6519.5722	1106.71
6.76	4382.65	7706.91	6508.4550	1106.70
6.80	4151.80	7686.87	6496.5498	1106.69
6.85	3980.94	7665.82	6483.9155	1106.67
6.89	3880.08	7643.44	6470.5537	1106.66
6.93	3459.22	7619.85	6456.4707	1106.64
6.97	3226.37	7595.07	6441.6709	1106.62
7.01	3017.52	7569.15	6426.1923	1106.61
7.06	2846.80	7542.27	6410.1435	1106.59
7.10	2676.09	7514.54	6393.5966	1106.57
7.14	2505.38	7486.02	6376.5546	1106.55
7.18	2334.66	7456.66	6359.0205	1106.53
7.22	2163.95	7426.47	6340.9976	1106.51
7.27	2011.17	7395.53	6322.5185	1106.49
7.31	1887.61	7363.96	6303.6699	1106.47
7.35	1764.05	7331.86	6284.5009	1106.45
7.39	1640.49	7299.33	6265.0166	1106.43
7.43	1516.94	7266.07	6245.2177	1106.40
7.48	1393.38	7232.39	6225.1054	1106.38
7.52	1281.52	7198.22	6204.7021	1106.36
7.56	1185.30	7163.65	6184.0576	1106.34
7.60	1089.09	7128.71	6163.1992	1106.31
7.64	992.87	7093.43	6142.1289	1106.29
7.69	896.65	7057.79	6120.8476	1106.27
7.73	800.43	7021.80	6099.3574	1106.24
7.77	717.47	6985.50	6077.6816	1106.22
7.81	649.14	6948.97	6055.8691	1106.19
7.85	580.81	6912.26	6033.9463	1106.17
7.89	512.48	6875.36	6011.9140	1106.14
7.94	444.15	6838.28	5989.7734	1106.12
7.98	375.82	6801.02	5967.5244	1106.09
8.02	321.66	6763.62	5945.1923	1106.07
8.06	290.40	6726.16	5922.8252	1106.05
8.11	259.14	6688.68	5900.4443	1106.02
8.15	197.59	6651.18	5878.0507	1106.00
8.19	156.63	6613.33	5855.6416	1105.97
8.23	115.37	6579.46	5833.2129	1105.94

MAX. VALUES	28057.14	7831.02	1106.79
MIN. VALUES	0.00	0.00	1098.00

INVENTORY FORMS

APPENDIX E

END

FILMED

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DTIC